The American Quarterly of Roentgenology

Edited by P. M. Hickey, M. D.

Vol. II DECEMBER, 1909 No. 1

THE X-RAY EXAMINATION OF THE MASTOID REGION.

BY DR. SIDNEY LANGE.

Radiographer to Cincinnati Hospital.

About a year and a half ago (March, 1908), I undertook some X-ray examinations of the mastoid region. I had repeatedly obtained outlines of the mastoid cells upon lateral views of the skull taken for other purposes and occasionally obtained a hazy shadow of the mastoid process on postero-anterior frontal sinus skiagrams, but I doubted that any practical information concerning the mastoid region could be gathered in this manner.

By way of experiment, the various positions were tried upon cadavers and normal individuals. The postero-anterior position was discarded because the distance of the mastoid process from the plate rendered its details indistinct, and because in this position the X-light traversed the bone in its greatest diameter, and the cells were all superimposed. The lateral view

Fig. 1.—Patient and tube in position for a mastoid skiagram.

was likewise unsatisfactory, because of the superimposition of the opposite side. The oblique lateral view avoided the opposite side and showed the mastoid fairly well, but the oblique postero-lateral view seemed to give the clearest and most extensive profile view of the mastoid. The pyramid is thus thrown forward and the mastoid details, especially the groove for the lateral sinus, is shown better than in any other position.

The double inclination of the axis of the rays (in the oblique postero-lateral position) coming as they do from above and behind has raised the question of excessive distortion of the relations of the mastoid region. It was especially feared that the distance of the sigmoid groove from the external auditory meatus would be inexact. To decide this question the mastoid process in a dried skull was sawn through vertically and the groove for the lateral sinus, external auditory meatus and tip were marked with small pieces of lead. Skiagraphs were then made in the oblique lateral and in the oblique postero-lateral positions. A comparison of the actual distances on the dried skull with the measurements made from the skiagrams showed that the skiagram enlarged the region slightly, but the actual distance from the external auditory meatus to the groove for the lateral sinus was never more than two millimetres less than that shown on either skiagram.

For the oblique postero-lateral view the patient lies on his side, with the mastoid to be radiographed resting against the plate, and the rays are directed from above (cephalad) and behind, entering obliquely just below the parietal eminence of the upper side, and pointing toward the mastoid process of the opposite side. The most favorable angle was measured. The axis of the compression cylinder is tilted upward (cephalad) at the angle of 25° from the plane of the base of the skull (Reid's base line), and inclined backward 20° from a plane passing vertically (assuming the patient to be erect) through both external auditory meati. This double inclination is well shown on a dried skull which will be exhibited.

As a foundation for the interpretation of the shadows thus obtained, several dried specimens were prepared by outlining

the various parts of the temporal bone with wire, and then skiagraphing. The external auditory meatus, antrum, groove for the lateral sinus, tegmen tympani and tip of mastoid, all important surgical landmarks, were thus identified. In order to aid in the interpretation of the skiagrams made from the living, a small circle of wire is placed in the external auditory meatus, and a small piece of wire placed over the mastoid tip. These metal markers may, however, be dispensed with after one becomes familiar with the shadows. The external auditory meatus can usually be located from its position just back of the condyle of the lower jaw, which point is easily recognized on almost all of the plates. Likewise the tip of the mastoid is usually recognizable except in the dense or diploetic type of mastoid, where it may be indistinct. The external ear should be folded forward out of the way, as its cartilages sometimes cast faint shadows on the plate. The ear may be held forward by adhesive plaster, or more simply by drawing the ear forward, and have patient keep it there by resting the head on the plate.

In regard to the technique of the exposure, little need be said to an audience of this character. Owing to an imperfect technique with an exposure of 40 seconds my early plates were rather unsatisfactory from the standpoint of the Roentgen expert, although all of them were of assistance to the clinician. More recently, I have shortened the exposure to 5 or 10 seconds, and I am obtaining more uniform plates.

Since the healthy mastoid is the basis of comparison for the diseased mastoid, both sides must be skiagraphed. If the exposure be under 10 seconds, and a few minutes allowed to elapse between exposures for a partial cooling of the tube, the same tube may be advantageously used for both exposures, to insure equality of definition and penetration. Since the conclusions drawn from the plates are based upon density as well as detail, it is very important to secure uniform plates of both mastoids. Most of my failures have been due to the difficulty of obtaining such uniform plates.

The comparison of the two sides is facilitated by taking both on a 11x14 plate, covering over half of the plate with lead while

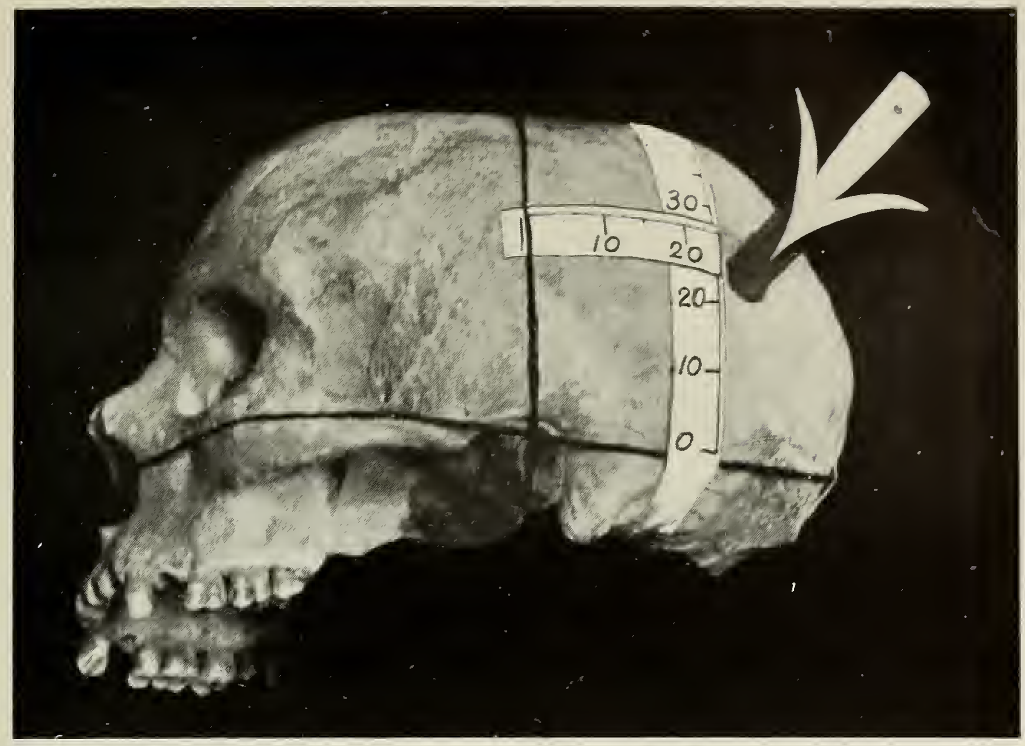


Fig. 2.—Skull showing proper angle for mastoid skiagrams.

Fig. 3.— A normal adult mastoid.—Sidney Lange, M. D.

exposing the other half. Alopecia is guarded against by using a piece of sole leather, glued to a thin sheet of aluminum. A small compression cylinder, 4 or 4½ inches in diameter, will improve the quality of the plates. The most valuable plates are those which are thin and slightly underexposed rather than those which are dense, for slight changes in density will be sought for more often than gross alterations of bone detail.

The fact that a skiagram of the diseased ear is often valueless without comparison with the other or normal ear brings up the all-important question, whether both mastoids of a given individual are normally identical in density and structure, or approximately so. Since variations are common in all parts of the body, the same may be expected in the mastoid region, yet I have found the closest resemblance of the two sides in most of the normal cases examined. While there may be variations in the size, shape and position of the mastoid cells, there is a close similarity of type, that is, if there is a dense or diploetic mastoid on one side, there will be the same on the other, or if one side is very cellular or pneumatic the other side will be of the same type. Plageman (6) says "Upon a basis of 85 skiagrams of normal skulls we find that as a rule the two mastoid processes of healthy individuals are almost identical."

A review of the literature of the X-ray examination of the mastoid as given by Voss (5) disclosed the fact that the earliest attempt to study the mastoid with the X-ray was in 1898 by Brühl (3), who outlined the mastoid in the dried skull by injecting mercury. Henle and Hinsberg (1) in 1904 first attempted it on the living. The appearance of Schuller's Atlas (2) in 1905 upon the Roentgen study of the base of the skull, gave further impetus to this field. Holzknecht's introduction contained in this Atlas is prophetic in suggesting that the confusion of shadows of the base of the skull will be cleared up, and put to practical use. Voss (5) in 1907, made a series of examinations in the lateral direction. He mentions having obtained all the important anatomical details upon the plate, including the internal auditory meatus. Recent and more extensive observations are by Kuhne and Plageman (7). They

discarded the lateral and oblique lateral positions and adopted the postero-anterior as the most satisfactory, because both mastoids appear upon the same plate, facilitating comparison. They report a series of 15 clinical cases. Jansen (14) recommends both the postero-anterior and the oblique-lateral views. Beck (13) has used the oblique lateral position.

That the oblique postero-lateral position gives the clearest and most extensive view of the mastoid cannot be questioned. The adherents of the postero-anterior view consider that view superior because both mastoids are shown upon the same plate, by the same exposure. The difficulty of obtaining uniform lateral plates of both mastoids has been the chief objection to the lateral positions, but the great advance in technique and apparatus in the last few years should render two such uniform exposures possible.

The Roentgen examination of the mastoid process is valuable from both the anatomic and the clinical aspects.

From the purely anatomic stand-point information concerning the mastoid may be gained, that may prove of great value in operating in this region. In the X-ray examination of the frontal sinuses, the anatomic information afforded is just as valuable as the pathologic. This applies with equal force to the mastoid.

Since the external auditory meatus and the groove for the lateral or sigmoid sinus are readily identified upon the skiagram, the distance between these two landmarks may be measured, not accurately, but approximately, always allowing for slight oblique distortion, and thus the area of the operative field may be determined. This is of no small consequence, as the choice of operative procedures may depend upon whether there is a forward lying sinus or not. Three types of normal mastoid processes are recognized by Politzer (10)—the pneumatic or cellular type, the diploetic or spongy type, and the mixed types. The pneumatic mastoid is extensive, has numerous large and small cells, and the lateral sinus is usually placed some distance back of the external auditory meatus, giving plenty of room for the usual operative procedure. In the diploetic or dense types the mastoid process is small, has

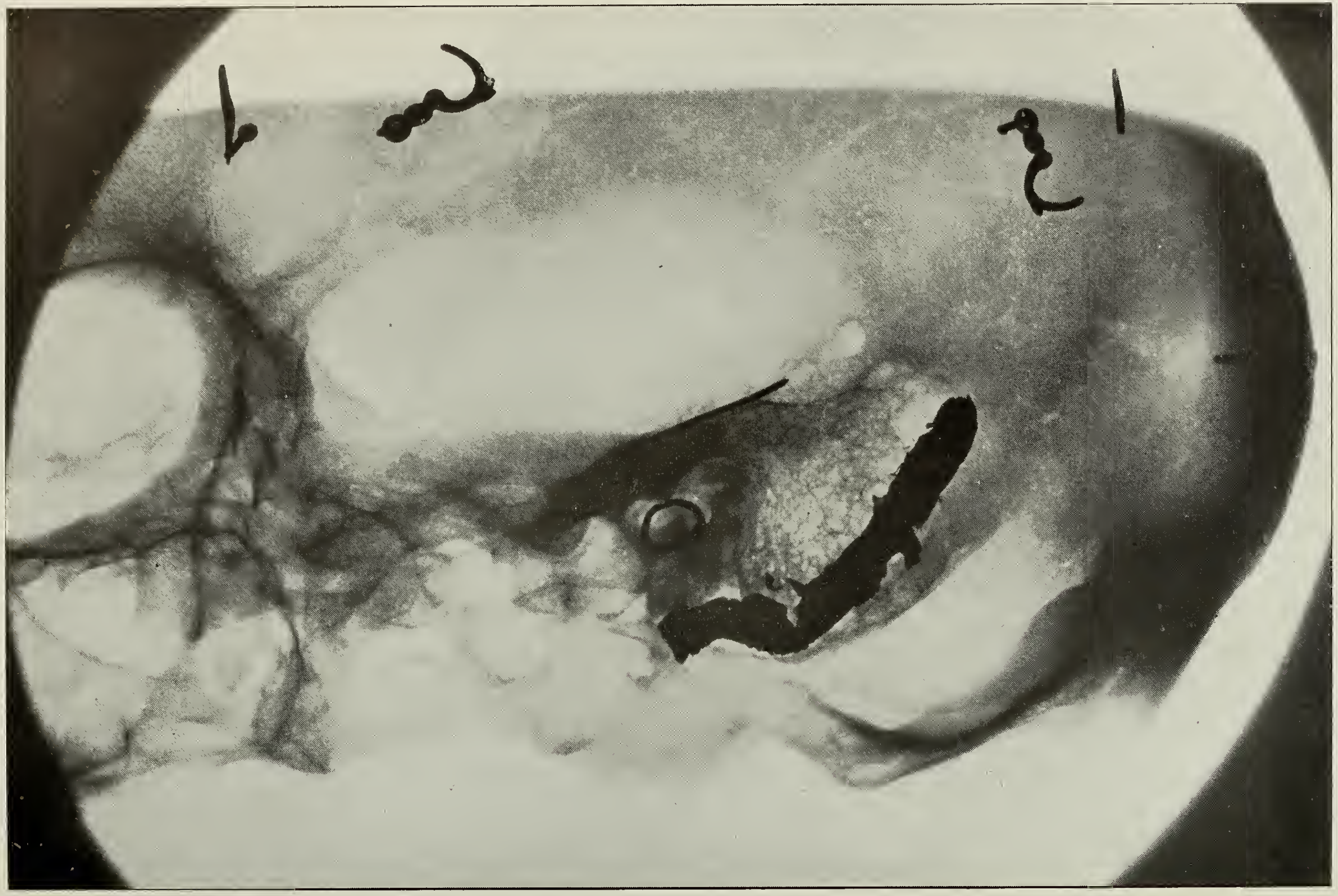


FIG. 4.—Skull showing anatomical landmarks. Ring in external auditory meatus; wire on tegmen tympani; lead foil in groove for lateral sinus and small emissary vein.—Sidney Lange, M. D.

fewer and poorly developed cells, and the lateral sinus lies nearer the external auditory canal. In these cases there is more danger of chiseling into the lateral sinus, and more caution is necessary in operating. Kanasugi (8) examined the mastoid process of 4000 skulls and makes the above statements. In his Atlas, entitled Pars Mastoidea, he calls attention to several mastoid anomalies which should be recognized by Roentgen examination.

The floor of the middle fossa can be located by the skiagam, and if this floor be very low, it would be of considerable importance in operating, to know this in order to guard against penetrating the cranial cavity. Some idea of the thickness of the tegmen tympani may likewise be gained. The presence of cells in the base of the zygoma may be shown. Whiting (9), in his text-book, calls attention to the importance of cleaning out these cells. Cells overlying or underlying the lateral sinus are shown on the skiagram. In addition, some less practical anatomic points may be shown. The facial canal shows up in skiagrams of the dried skull. The jugular bulb is sometimes evident in skiagrams on the living. In one case of a child, I was able to see faintly the semi-circular canals. Dr. Pfahler informed me that he was able in one case to outline the ossicles. Jansen (14), in the oblique lateral position has shown the hammer and semi-circular canals.

Upon the mastoid skiagrams of children under 10 years the mastoid appears entirely spongy or diploetic, there are no visible cells, and the tip is undeveloped. The tip at this time consists simply of an inner and outer table, with little calcellous bone between, and shows no structure upon the skiagram. From 10 to 15 years the mastoid takes on the pneumatic characteristics, large cells appear, and grow downward toward the tip, its diploetic structure finally giving way to the more or less pneumatic adult type.

In interpreting mastoid skiagrams it may not be amiss to inquire if the patient has had mastoid trouble previously in childhood for a previous inflammation and sclerosis may have retarded the development, and altered the appearance of the adult mastoid, thus leading to error.

The clinical aspect of the X-ray examination of the mastoid especially in the milder acute cases is on less certain ground. That gross thickening of bone or gross destruction can be demonstrated upon the skiagram is certain. The chief field for research is to determine whether the **milder** pathological changes, such as inflammation and suppuration of the mastoid mucosa without gross bone destruction will always show upon the skiagram, and whether indications for operation can be deduced therefrom. It remains also to be determined whether small sequestra will show.

The most reliable results are obtained in the **chronic** cases. In almost all the chronic cases examined, the skiagram has given practical and valuable information, showing usually more or less marked sclerosis with haziness or obliteration of the mastoid cells. In one case a defect in the tegmen tympani with haziness and thickening of the mastoid cells was noted. These findings were verified later by operation. The X-ray examination of these chronic cases is often a welcome aid to the otologist, who in treating persistent middle ear disease may be in doubt whether to resort to operative measures or not. Furthermore, cases are on record in which general or localized septic symptoms have originated from a chronic necrotic process in the mastoid, which has developed without marked signs referable to the mastoid. The X-ray may aid in clearing up such cases. Bussey (11) has recently reported 14 cases (13 collected from the literature, and one of his own) of mastoid abscess, in which the signs were anomalous, few or no symptoms referable to the mastoid, and no discharge from the ear. The X-ray may be valuable in this type.

Only a small number of the **milder acute** cases were examined, and no conclusions could be drawn. In several a slight haziness over the mastoid was noted which disappeared again after spontaneous recovery. It is not unlikely that valuable information may be gained regarding the milder acute cases, if plates more technically perfect than those to be exhibited are obtained. Those **severe** acute cases accompanied by extensive bone destruction with abscess formation can, of course, be easily recognized. In two cases, an abscess of the

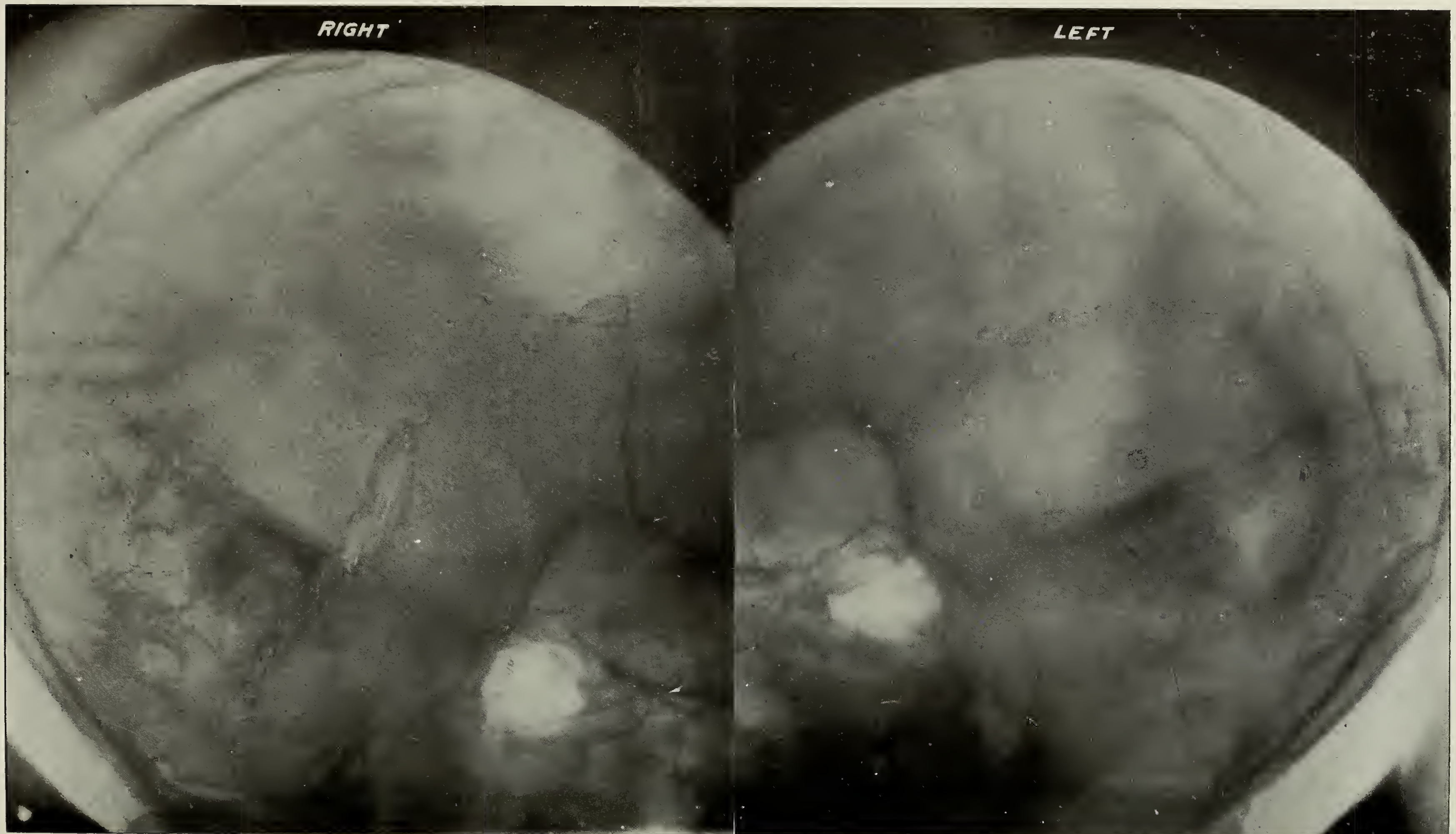


FIG. 5.—The normal mastoid. Extensive destruction of mastoid.
Acute necrosis of mastoid (verified by operation).—Sidney Lange, M. D.

mastoid was diagnosed from the skiagram and verified by operation. In one of these cases the drum could not be seen owing to swelling of the external auditory canal. Furunculosis was being considered until the X-ray showed the bone destruction in the mastoid.

In conclusion, it may be stated that the interpretation of mastoid skiagrams demands much study, and the enthusiastic co-operation of the otologist. Without the latter, little can be accomplished, for the otologist must correlate the X-ray and the clinical findings, and check up the results by operation. For such aid in interpretation and for the privilege of examining many of the clinical cases, I am indebted to Dr. S. Iglauer (12) at whose suggestion and direction I undertook the work.

Since writing the above it has been found advantageous in certain types of skulls to decrease the angles of inclination of the axis of the rays. If the upward (cephalad) slant from Reid's base line be decreased (from 25) to 20 degrees and the backward slant be decreased (from 20) to 10 degrees a more transverse profile view of the mastoid will be obtained with less oblique distortion.

REFERENCES.

1. Henle & Hinsberg—Zeitschrf. f. Ohrenheilk. Bd. LI S. 59.

2. Schuller—Die Schadelbasis in Rontgenbilde, 1905.

3. Bruhl—Anatom. Anzeiger. XIV, 1898.

4. Winckler—Centralbl. f. Ohrenheilk. Bd. IV, No 11.

5. Voss—Behandlung der Deutschen Otologischer Gesellschaft, May, 1908.

6. Plageman—Verhandlung der Deutsche Rontgengesellschaft, Bd. IV, Sept., 1908.

7. Kuhne & Plageman—Fortschritte auf den Gebiete der Rontgenstrahlen Bd. XII, Heft. 5, Sept., 1908.

8. Kanasugi—Pars Mastoidea—Alfred Holder, 1908.

9. Whiting—The Modern Mastoid Operations.

10. Politzer—Ohrenheilkunde, 1893.

11. Bussey—Iowa State Med. Journ. Jan., 1909.

12. Iglauer—Presented Amer. Laryng. Rhinol. Otolog. Society, Jan., 1909.

Also—Jour. Amer. Med. Assoc., Sept. 25, 1909.

13. Beck—Laryngoscope, Sept., 1909.

14. Jansen—Deutsch Zeitschrift fur Chirurgie, July, 1909. Band 99—Heft 3-6—Seite 526.

DISCUSSION.

DR. E. W. CALDWELL, NEW YORK.

It is rather difficult to discuss a subject of which you know practically nothing. I have never made a radiograph of a mastoid, but after listening to this paper, I shall have no hesitation in attempting to make one. Everyone who has done any radiographic work on the skull will appreciate what beautiful work Dr. Lange has shown us. I do not feel competent to enter into a discussion of the details of the technic, except in one or two particulars. One of these is that it occurs to me that this is a field in which the stereoscope would prove particularly valuable, and I wish Dr. Lange would tell us of any attempts he may have made in making stereoscopic views of this region.

The other point: In locating these planes, the Doctor gave as one landmark, the external auditory meati. Of course, the plane must be located by at least three points, and I should need more careful directions then he has given us to get that plane. My experience in making radiographs of any part of the skull has taught me that it is exceedingly difficult to get landmarks which are really useful.

DR. CHARLES F. BOWEN, COLUMBUS, OHIO.

This work is as new to me as it is to Dr. Caldwell, but I am sufficiently impressed with the importance of this work. I have had some personal experience which has confirmed that impression. It was in a case of mastoid disease following

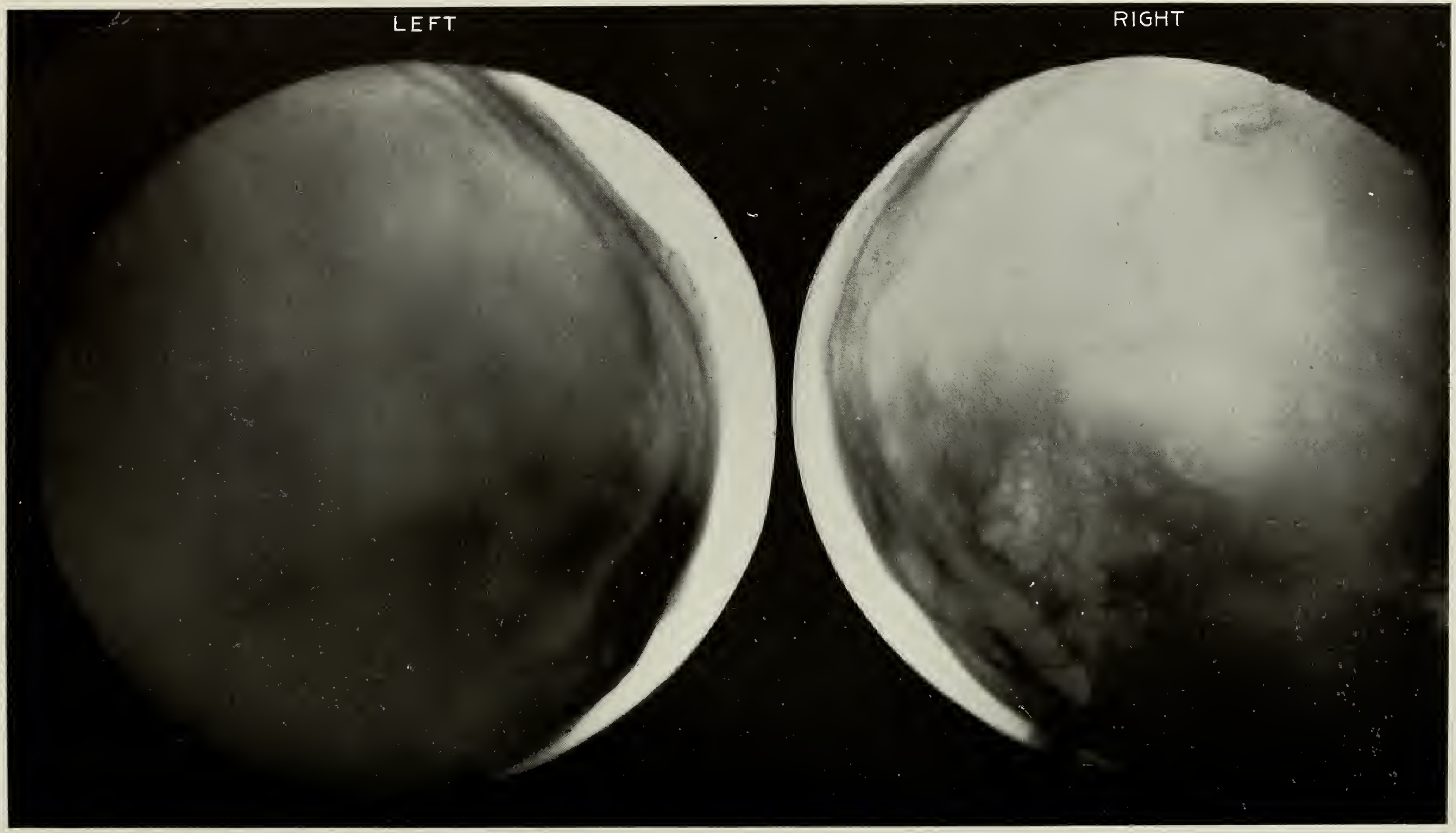


FIG. 6.—Complete sclerosis with obliteration of cells. The normal mastoid.
Sclerosis of mastoid (verified by operation).—Sidney Lange, M. D.

middle ear trouble of some standing. The surgeon who operated started to perform the usual operation, and after working a few minutes with hammer and chisel, his chisel slid into the lateral sinus, which was in an anomalous position. Had he made a radiograph beforehand, the position of this sinus would have become apparent to him and he would have avoided the accident and would have made unnecessary a second operation.

That, it seems to me, demonstrates the value of the radiograph in this class of work. I wish to thank Dr. Lange for presenting this excellent paper to the Society.

DR. WILLIS F. MANGES, PHILADELPHIA.

I have been considerably interested in mastoid radiography. Dr. Lange's work is highly commendable. I have been using stereoscopic roentgenograms in this study, and I am convinced that it is an advantage over the ordinary skiagram. Variations or anomalies in the lateral sinus are more clearly defined. Of course, it means that you must make two equally good plates, which is sometimes difficult of accomplishment in a part as thick as the skull. I believe that I have succeeded in showing the otologists that we are in a position to help them in their work. I recently had a case in which the mastoid cells were not involved at all, but the radiogram showed an area of necrosis that seemed to be on the floor of the auditory canal. There was considerable bone destruction. It was possible to trace the extent of the process definitely. The relation between the external and the internal auditory meati was very clearly shown. I believe that the stereoscope is most useful in this line of work.

This paper opens up a field of work which is worthy of development. I believe it is even more important than frontal sinus work, and that it will be a great benefit to the profession.

DR. GEORGE E. PFAHLER, PHILADELPHIA.

I think we ought to congratulate Dr. Lange on the beautiful work he has done and for presenting the results of his work

so clearly and concisely. I have not done nearly the amount of work that he has done, but enough to be impressed with its importance. About three years ago Dr. Hickey and I looked over some plates I had made, and I demonstrated them at the meeting of the Section on Stomatology of the College of Physicians. I think my point of localization was almost exactly the same as the one described by Dr. Lange. I have done less of that work since then because there did not seem to be any great demand for it. I did some experimental work on the skull and radiographed a few clinical cases, but for some reason the otologists and rhinologists in Philadelphia are slow to appreciate the value of the Roentgen ray as an aid in their line of work.

DR. GEORGE C. JOHNSTON, PITTSBURG.

Frontal sinus work was popularized some years ago by Dr. Caldwell, and kidney work was given its first impetus by Dr. Leonard. Now Dr. Lange has shown us what can be done in mastoid work. It is a great benefit to the profession. And yet many men do not use the Roentgen ray for locating foreign bodies in the eye. They claim that they can do everything with the Haab magnet, which in reality will attract only certain bodies. The Roentgen ray will show them all. In rhinology the examination of the sinuses is usually made by means of transillumination, but by and by the rhinologist will come to learn and appreciate that transillumination is a very deceptive agent, and after he has seen a few cases in which the right antrum is opaque and the left is clear, and he operates, only to find, much to his surprise, that the right antrum is clean and that the left is full of pus, he will lose his faith in transillumination and place reliance entirely on the Roentgen ray.

Mastoid work is new to us all, and if the members of this Society will give some time to the development of this work, they will find that in another year a considerable amount of this work will be demanded, thereby increasing the respect of the general profession and especially of the rhinologist for the Roentgen ray.

DR. LANGE (closing the discussion).

With regard to the points of localization mentioned by Dr. Caldwell: The vertical plane passes through the external auditory meati; its third point is located by assuming the patient to be in the erect posture and passing the plane vertically through the two external auditory meati; then it is tilted backward twenty degrees. The other plane passes through Reid's base line and is tilted 25 degrees cephalad. However, each case must be judged by itself. We should study the skull and then make the view in the plane that is best suited for that particular case.

I gathered from Dr. Beck's report that he made use of only one inclination, but I found that it would superimpose the edge of the petrous portion of the temporal bone on the lateral sinus.

Regarding stereoscopic pictures, I believe Dr. Manges is right, but I think I am exceedingly lucky when I get one good picture of each side, although stereoscopic plates would be of great value, if four uniform plates could be obtained.

With regard to the value of this work, I was at first somewhat skeptical on that point, but I am convinced now that there is not one chronic case out of ten in which the Roentgen ray will fail to show something of value. In the acute cases, the severe cases, where there is bone destruction, one ought to be able to show this if the skiagraph is perfect, but a simple, suppurative inflammation of the mucosa may not show. I do not know about that. After all, what the aurist wants to know is whether or not an operation is indicated, whether spontaneous recovery is possible or whether extensive bone destruction precludes this. If we make a picture of the mastoid and compare it with a picture of the opposite mastoid, we can say whether they are alike or not, although we cannot say whether they are inflamed or not. But bone destruction is readily distinguishable. If the mastoid cells are indistinct or destroyed we can say in all probability the patient should be operated on.

I want to repeat again that every otologist will frequently find cases in his practice where he is unable to determine

whether or not there is a chronic destructive process in the mastoid. By means of the Roentgen ray he can determine what is going on in those bones and what should be done. Several otologists have told me of cases where the entire mastoid was broken down and yet few symptoms were manifested, possibly only a little vertigo, but no swelling or pain.

With regard to Dr. Pfahler's remarks, I knew that he had been doing this work for some time; in fact, he spoke to me last June about making good plates and using approximately the same angle as I did, but I could not find any reference in the literature to his work.

NOTES FROM SOME OF THE ROENTGEN LABORATORIES OF EUROPE.

BY G. E. PFAHLER, M. D., PHILADELPHIA, PA.

After some correspondence between our President and myself before I left for Europe, we agreed that it might be advantageous to the Society to prepare some notes upon my return. This has proved more difficult than I at first anticipated.

I have only been able to visit some of the best laboratories, which were under the direction of men whom we know and admire because of their advance work. While I have seen comparatively few, I believe they may be considered the representative laboratories of Europe.

Many of the leading men were absent on their vacations, but I was shown every courtesy by the associates or assistants. I may say that every one was most courteous.

In Hamburg I was able to visit the Allgemeinen Krankenhause of St. George, and Prof. Albers-Schonberg's Roentgen Institute through the courtesy of his associate Dr. Foedor Haenish, to whom I am especially indebted. With his work most of you are familiar. I was permitted to see many of his kidney plates, which were the most beautiful I have ever seen. In the majority of cases he is able to demonstrate clearly the outline of the shadow of the kidneys. His technique is fully described in his book published about a year ago and entitled "Roentgendiagnostik des uropoetischen Systems, 1908." I would especially call attention, however, to the use of the "Luffa Schwam" which he recommends, and which consists of the leaf sponge sewed together and covered with muslin, and then placed under the Albers-Schonberg compression diaphragm. This simply gives additional compression and prevents the abdominal tissues from crowding up in the cylinder.

He also demonstrated a number of plates to me showing supernumerary and accessory bones, especially in the foot, which might easily be mistaken for separations by fracture.

These are not new, but have been described in old anatomies, and are referred to in allied literature. One is therefore impressed with the fact that the Roentgenologist of today must be a thorough student, not only of the literature upon Roentgenology, but upon allied subjects, and there are few subjects that do not bear some intimate relationship to our specialty. Unfortunately our literature, in America, is scattered, and because it must be published in the general medical journals, it is necessary to write for the general practitioner. The demand for short papers compels us to omit many details that are of vital interest to the Roentgenologist. While we are often impressed with the verbosity of the German and French writers we are compelled to admire their thoroughness.

For the sake of brevity I will omit many points that might be discussed, and limit myself to the most striking ones.

Dr. Schmidt, of Berlin, showed me an interesting experiment which was first described by Dr. Schwarz, of Vienna. He compressed the middle of the palmar surface of the finger of a healthy hand. The remainder of the finger was covered with the same material and in like thickness. The whole finger was then exposed to the Rays sufficiently to produce blebs, which occurred only on the parts of the skin which were not compressed. The middle part of the finger which was compressed showed no effect. This strikes me as an important point for discussion and further investigation. It seems to indicate that the effects of the rays depend upon the blood content of the tissues. One is struck by the contrast with the Finsen treatment, in which the tissues are compressed in order to obtain the best effects. This experiment seems to have direct bearing upon the very principle of our therapeutic work.

The most wonderful advance made in Roentgenology, I believe, is that by Prof. Rieder and Drs. Kostle and Rosenthal in the production of actual cinematographic Roentgenograms of the internal organs. Cinematographic Roentgenograms have been made before, by the slow process, in which a number of Roentgenograms were made separately and not in rapid succession, so that when reproduced on a cinematographic film and moved rapidly, they produced the effect of motion. We

all remember the beautiful film loaned to this society two years ago by Dr. Alban Kohler which so well demonstrated the effects of the movements of the diaphragm upon the heart and lungs. (I regret deeply that I was not able to accept Dr. Kohler's earnest invitation to visit his laboratory. The society, I am sure, would have been under further obligations for some new advance.)

Prof. Rieder and Dr. Kostle were absent from Munich, and in their absence Dr. Rosenthal demonstrated to me their cinematographic films, showing the effect of the movements of the diaphragm upon the right side of the heart, and the peristaltic movements of the normal stomach. These Roentgenograms were made in rapid succession upon 8 x 10 inch films. The films were changed by means of an automatic mechanism, which I was not permitted to see. (Dr. Rosenthal, not being a physician, has the privilege of secrecy.) I was told that this automatic mechanism worked synchronously with the making and breaking in the primary current through the coil.

The large films were then reduced to a small cinematographic film; and these were demonstrated directly by looking through the moving film by means of a magnifying lens, which showed the peristaltic movements most beautifully. I had hoped to have the films and the apparatus sent to the ship and to have brought them to America to demonstrate to this society at this meeting. There has been some delay due to the absence of Prof. Rieder and Dr. Kostle. However, if they concur, Dr. Rosenthal promised to send them later, and I hope to have the privilege of demonstrating them to at least a part of this society.

The thoracic film consisted of six exposures. The stomach film consisted of twelve, and these twelve were made in rapid succession during the time that the patient held his breath. This means that within twenty or thirty seconds twelve stomach plates were made. This of necessity included the time during which the films were changed, which must reduce the time of each exposure to less than a second. I am told that approximately 100 m. a. passed through the tube. When one

realizes that the same tube must be used for the twelve exposures, it must be acknowledged a truly wonderful result.

This film of the stomach demonstrated two distinct indentations or waves in the lower part of the lesser curvature at the same time and at a certain period of almost equal depth. This can hardly be observed fluoroscopically, and is, I believe, a new observation. The peristaltic waves of the greater curvature correspond to those seen fluoroscopically.

As to the practical applications of this cinematographic work in diseased conditions, I am less enthusiastic. While it would be of value in the accurate record of stomach motility, especially in the study of malignant disease, the great skill required, the costly apparatus, the cost of material and the amount of work required, I fear will make it almost prohibitive. It will find a practical application in the study of physiology, and in special pathological cases records may be made and preserved for teaching purposes. An endowment would make this work possible.

Though my notes are becoming extensive I must refer to the excellent work of Holzknecht in the diagnosis of malignant conditions of the stomach. The vast amount of material at his command has enabled him to develop much skill, and I think he has established beyond a doubt the value of the fluoroscope in the study of the stomach. When I see his dermatitis however, I shudder at the amount of exposure to which he subjects himself.

I was privileged to visit the Allgemeinen Krankenhause and Prof. Albers-Schonberg's Roentgen Institute in Hamburg, through the courtesy of Dr. Foedor Haenish. In Berlin I visited the Rudolph Virchow Krankenhause, in the absence of the director, Dr. Levy Dorn, by the courtesy of his assistant, Dr. Hessmann, of the Charité Hospital; also Drs. Immelman, Schmidt and Max Levy in their private laboratories. In Munich I visited Prof. Rieders and Dr. Grashey's laboratories in the Allgemeinen Krankenhause, and in Vienna Dr. Holzknecht in the Allgemeinen Krankenhause and Prof. Schiff and Dr. I. Robinson in their private laboratories. In Paris Dr.

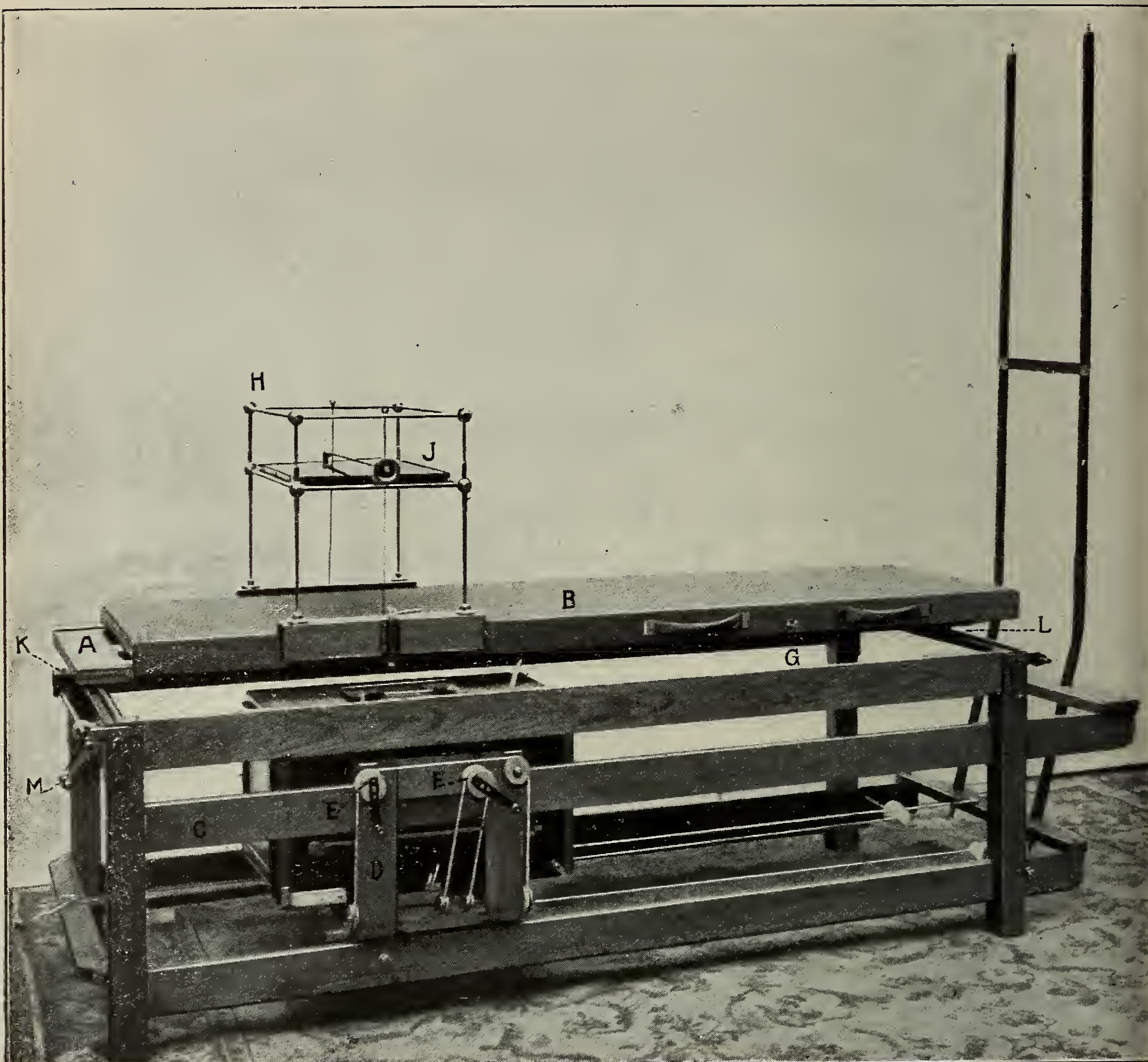
Beclére's laboratories in the St. Antoine Hospital, through the courtesy of Dr. Lebard and Dr. Jangeas. To these gentlemen I am deeply indebted. Time will not permit further discussion of the excellent work which they are doing, but I shall briefly refer to the equipment used in their laboratories.

EQUIPMENT.

Before referring to individual instruments I cannot refrain from referring to two hospital laboratories which might serve as present-day models. One is in the Allgemeinen Krankenhause of St. George in Hamburg, under the direction of Prof. Albers-Schonberg; and the other is that of Rudolph Virchow Krankenhause in Berlin, under the direction of Dr. Levy Dorn. Both of these laboratories are provided with plenty of space, plenty of permanent assistance and the most modern equipment. The good general work done by these two masters in these laboratories is known to all well-informed Roentgenologists. The Roentgen laboratory of the Rudolph Virchow Krankenhause occupies an entire building which was designed for the purpose, and in which convenience, space and protection are the main features. Each laboratory has special apparatus designed by the physician in charge to meet some specific purpose. Most of these are known to the Roentgenologists who are familiar with the current German and French literature. To those I offer an apology. I will only speak of four in this paper and will simply demonstrate the others upon the screen by means of lantern slides.

First.—The Trokoscope or orthodiagraphic examining table of Dr. Foedor Haenish. This table permits both Roentgenoscopic and Roentgenographic examinations in the horizontal position with the tube either below or above the patient. It permits accurate movement of the patient alone having the tube and screen stationary, or permits the movement of the tube and screen in unison. During these examinations the tube is in a protection box. It permits of the adjustment of the plate to irregular parts of the body at unusual angles.

Second.—The Quantimeter of Kienbeck. This consists of strips of photographic paper placed upon the skin of the patient during the exposure, then developed and compared with a

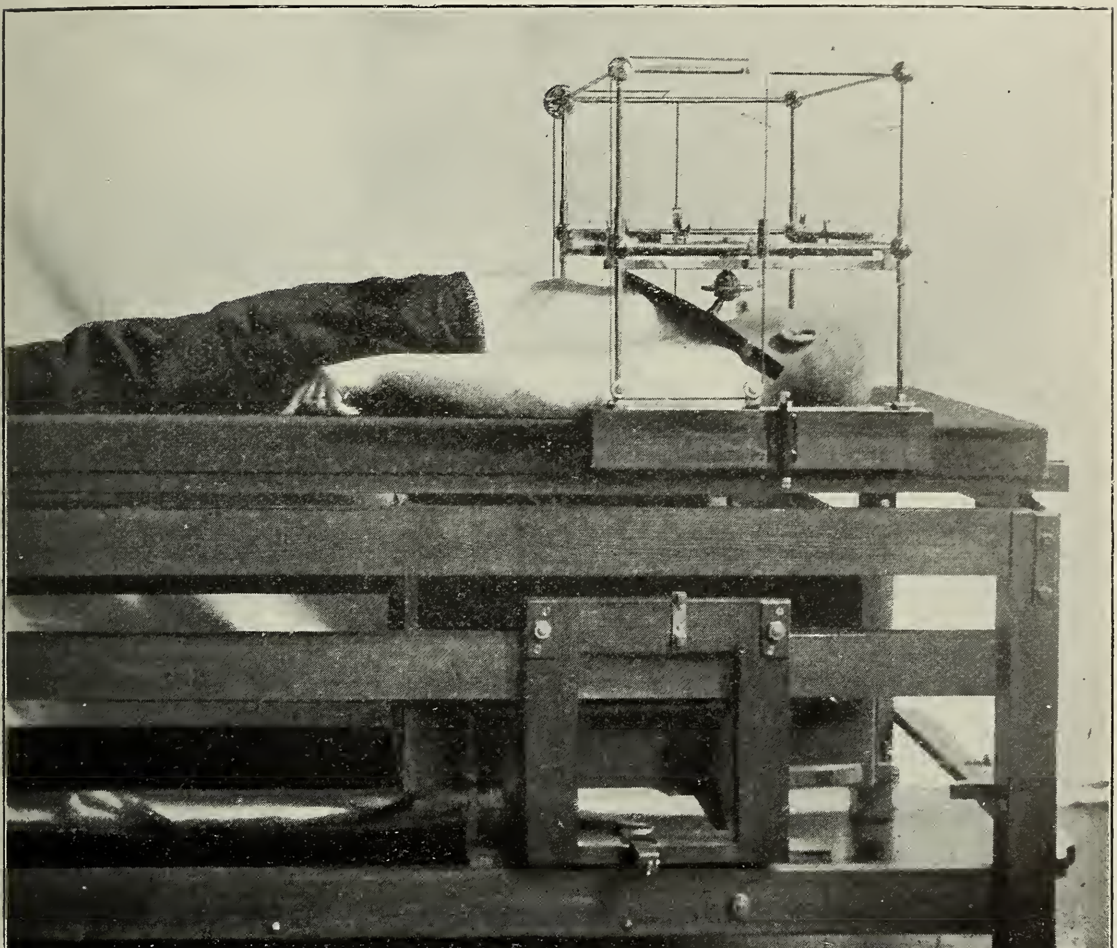


Trokoscope or Orthodiagraphic Examination Table of Dr. Foedor Haenish

standard scale, ten units of which is the dose required to produce a reaction of the skin. While this Quantimeter permits of many technical errors, by careful attention to details it gives probably the most delicate measure of dose yet invented, especially for skin disease. In deep-seated disease, the personal

skill of the operator, based upon previous experience, must be depended upon until some other standard is established.

In connection with this instrument should be mentioned the Quantimeter of Immelmann and Lepper, in which a photo-



Application of the Trokoscope

graphic plate is exposed in a developer and examined during the exposure. Likewise Schwart's Quantimeter which depends upon a precipitate produced in a solution by the action of the rays; and Holzknecht's capsules containing a chemical substance which changes color under the influence of the rays; and then the barium platino cynanide disks of Saborand and Noire, which turn yellow under the action of the rays.

Third.—I would mention as new and unusual the Diaphragm of Lepper, which is constituted like an old fashioned water

wheel. It is revolved around the tube and the spaces between the paddles produce the diaphragm effect. This permits the exposure of a large plate, requiring, however, a corresponding long exposure.

Finally, I wish again to thank the men visited for their courtesy, the result of which I have tried briefly to express and I trust that this report may form a precedent for future visits of other Roentgenologists.

DISCUSSION.

DR. H. W. VAN ALLEN, SPRINGFIELD, MASSACHUSETTS.

The so-called Schwartz solution is a 4% solution of oxalate of mercury and 5% bi-chloride of silver. I have used it, but have found it to be very unstable and therefore unsatisfactory for practical use. I would like to ask Dr. Pfahler whether he has produced a dermatitis with ten measures of the measure he speaks of. I have known it to be produced across the water, and have wondered whether this was the correct amount.

I think that switch would be a most useful thing, because it would guide us in the length of our exposures.

In regard to the water-wheel arrangement, I saw the plates that Immelmann of Berlin made, and they were excellent. He skiagraphed only the long parts of the body, such as the extremities. I saw Holzknecht using the slat-sided diaphragm in his clinic, and it seemed to be very good. It left a rather irregular and unpleasant outline on the negative, at least the outside of the picture was irregular; a very minor thing, but unusually noticeable.

I was very much pleased with Dr. Haenisch's table. It was clumsy, as all German instruments are, but it was wonderful with what ease he could move his patient and the box beneath him. For taking ribs, the table was very useful. Dr. Haenisch treated us very nicely, showed us the advance sheets of his

book, and seemed to be willing at all times to give up his own time and pleasure to American doctors, and we learned much from him. He also showed us his leaf sponge, and he showed the outlines of the kidney better than I have ever seen them here.

In Berlin, in the Virchow Krankenhaus, the setting of the building was excellent,—sixteen rooms in a two-story building, each room specially equipped and plenty of assistants, so that they can do most excellent work. At Holzknecht's place we enjoyed very much his demonstration of the use of the fluoroscope. It was something to be remembered. His hands were in bad shape, but I think that was entirely due to the careless way in which he puts his hand back of the screen to manipulate the patient, or to manipulate the stomach if stomach action was not present. It does not seem possible, if circumstances were reversed, and the ordinary roentgenologist came from Europe to this country, that the courtesy would be extended to him by us as is shown the Americans by the Europeans.

In England they are using a large number of mercury interrupters with a gas above the mercury. They cut the current down to a very small amount and yet it is very effective. Their fluoroscopic work is wonderful. I have seen kidney stones fluoroscopically as I never saw them anywhere else.

DR. ARTHUR HOLDING, ALBANY, NEW YORK.

The subject might very well be divided into two parts, one taking up the operator's personality, and the other his apparatus and technic. The instruments I saw over there were very cumbersome, and considering this fact and one other, that duty must be paid on them, when they are brought into this country, as a rule it is not worth while bringing them over here. But many good ideas can be obtained there that ought to be introduced into American machines. One thing that struck me particularly was the large amount of fluoroscopic work they are doing. When I landed in Europe I was convinced that I would not do any fluoroscopic work under any

consideration, but I soon saw that it is a necessity. The thing is to make it safe, but we must come to it whether we will or not.

The Haenisch table, Albers-Schonberg "casette" or Bedere "stativ" must be modified by our manufacturers, so that they are more simple and more effective. In connection with fluoroscopy, the mercury interrupter working in a gas atmosphere (London) was another machine that seemed really worth while bringing back to America.

In conclusion there are a few points which I would like to mention. In Germany they are devoted to skiagraphic work but in Vienna almost entirely to fluoroscopic work. One country does not seem to blend with the other. The men differ in technic and everything else. When I saw the machine used by Rieder in Munich, I became convinced of the advantage of having a good electrical engineer interested in our work and living in the same town. One point I would like to ask Dr. Pfahler is whether he saw much of the fulguration work talked of so much in Amsterdam a year ago.

DR. WILLIAM H. DIEFFENBACH, NEW YORK.

Americans or Englishmen who go to Germany or Austria should not think of going there without a fairly good knowledge of German. You will find that many of the professors are unable to speak English, so that an American or Englishman who is not possessed of a fair knowledge of German will be laboring under a great disadvantage.

When I was visiting Holzknecht four years ago, a gentleman from Dublin was constantly asking me what the professor was saying, his appreciation of the demonstration being much impaired by his ignorance of German.

Another point to be remembered is this: Most of these men take their vacations in August, so that visitors from abroad should time their visits accordingly; otherwise they will find only the assistants, who, as a rule, however, are competent men and willing to show the apparatus and how it is used.

In regard to the Kienboeck quantimeter, I think that most of the men in Europe do not take kindly to it. The Sabouraud disks are used the most now, although at one time the Holzknecht apparatus was used very largely. Photographic paper always varies, even in one's possession, and if Dr. Pfahler brought over a quantity of that paper, he will find in a few months from now that the films have changed, making the method of measurement inaccurate and unreliable; that is the strongest criticism that can be made against the photographic paper measurement.

DR. D. R. BOWEN, ROME, N. Y.

My experience with reading German may be of use to some of you. During the past nine months, with practically no previous knowledge of German, and with only a little help from a now-medical teacher, I have been able to read Grashey's Atlas, the Roentgen Kalendar and some other papers. It has been rather slow but most interesting and not nearly so difficult as I had expected.

DR. CHARLES LESTER LEONARD, PHILADELPHIA, PA.

I want to say a word in reference to the advantage accruing to Americans who travel in Europe and see the work that is done by the men over there. It is an advantage not only to them, but also to those who remain at home, because the more the European roentgenologist knows of the American and his work, the better it will be for the reputation of American roentgenology, and the greater the credit which will accrue not only to this Society, but to every individual engaged in this line of work.

The meeting at Amsterdam last year was productive of much good in that it taught the Europeans to look to America for some original work in roentgenology, and I hope that more Americans will take occasion to attend the meeting which will be held next year (Sept. 13th to 18th) in Barcelona, Spain. By doing so, they will bring back to America the credit which is due the American roentgenologist for his original work in

this field. All of you who can should attend this Congress, and make yourselves felt as a force in Roentgen work the world over, as you are known to be in this country.

DR. PFAHLER (closing the discussion).

I have not yet produced a dermatitis, because the time that has elapsed since I began to use the scale is too short. Dr. Haenisch regards this test very highly, in fact he thinks it is the best, and it was on his recommendation that I got it. While there are errors there, and Kienboeck has called attention to all these errors, I can add nothing by way of suggestion in that line, and I believe that it is the most accurate method we have. It seems to be a complicated one, and it is time-consuming. That is one reason why the Sabouraud and Noire disks are so popular. We gave twice the dose with these disks, and I could not tell the difference, nor could anyone else. I do not believe that they are accurate, and the disks I had were not more than two weeks old.

THE ROENTGEN DIAGNOSIS IN PULMONARY TUBERCULOSIS.

BY CHARLES LESTER LEONARD, A. M., M. D., OF PHILADELPHIA.

The value of the Roentgen diagnosis in Pulmonary Tuberculosis has been fully established and a long list of honored Roentgenologists have each added to the value as step by step they have placed it in a position which makes it the most accurate method of determining the extent to which the lung has been involved by this pathologic process.

It is not the purpose of this paper to discuss the comparative values of this method or to attempt to add anything to the technique. The advances in this direction have not been great in recent years, but the knowledge of what can be shown has grown with the experience of close students of the subject. The conservative Roentgenologist has been content with demonstrating what can be shown in the negatives he produces, admitting that the etiologic factor can not be determined by this method, but claiming and proving that its mechanical accuracy and detail offer more exact data upon which to have a progressive and surer means of determining the progress of the disease and the effect of treatment.

The progress in technique has shown that to secure the greatest detail and enable the observer to recognize the most minute microscopic lesions, exposures must be employed that eliminate the motion given to the lungs by the pulsation of the heart. In addition there must remain sufficient density in the normal portions of the lung to ensure a contrast with the foci of disease.

The recognition of quality in negatives is an absolute essential to valuable diagnosis. The production of such negatives is, however, not sufficient to render the diagnosis valuable. The experience of the Roentgenologist in reading these data and his ability to rightly interpret them depends upon the number of cases examined and the care with which they have been studied.

It has been my good fortune to study a recent series of seventy and more cases with a group of internists who are doing systematic scientific clinical work. These cases were all carefully studied and charted, with complete data regarding symptoms, sputum examinations, tuberculin, and other tests, in addition to an accurate mapping out upon charts of the physical signs. The cases were sent in groups of five or six for Roentgen examination, and upon each group an evening was spent in comparing and discussing the data obtained by all methods of examination. The result has been most gratifying. The Roentgenologist has learned much in regard to interpretation, while the clinicians have been convinced of the value of this method as an aid to the accurate diagnosis of Pulmonary Tuberculosis. They say it is the best method of "jacking up" their physical diagnosis and of corroborating and amplifying it that they have found.

They admit that this method is of great value in the early stages of tubercular disease, because it adds definite evidence of pathologic change to a clinical picture which lacked confirmation by physical signs. Also that these added data often confirm an early diagnosis which could not have been made without it, though holding that this method of itself could not form the basis for a diagnosis.

It is with the purpose of pointing out the nature of the additions and confirmations which this method has produced in this series of cases that I bring this subject before you. They present probably nothing new to those conversant with the study of tuberculosis by this method, but they are the evidence which has convinced a group of careful clinical students that this method is essential to every complete clinical examination of a case of pulmonary tuberculosis as seen in the Roentgenogram.

Lesions deeply situated within the thorax have been repeatedly shown when they had escaped percussion and auscultation, while the symptoms pointed to a tubercular lesion.

Thus infiltrated and even calcified peri-bronchial glands have been shown before the tubercle bacillus had been found in the sputum. In many cases where physical signs were absent and the bacillus present, with symptoms pointing to the disease,

the picture has shown enlarged bronchial glands or deep-seated peri-bronchial infiltration. Increased density in the apices of the lungs has often confirmed a physical diagnosis of impaired resonance and altered breathing, while a dullness on percussion which seems superficial was shown to be due to a deep-seated infiltration or commencing consolidation.

The study of evident areas of consolidation, softening and cavitation determines more accurately their situation and extent, while not unfrequently deeply situated areas of consolidation and cavities have been shown that had escaped detection by other methods.

As has been said, the Roentgen rays take cognizance of the increase or decrease in relative density. Thus a marked contrast to the normal is shown between consolidation and compensatory emphysema, the latter being more readily penetrated than the normal lung.

A dilated bronchus can be shown for a similar reason, as in a recent case in which an area at the base of the right lung and in the median line posteriorly was supposed to be a localized empyema, but proved to be dilated bronchi that had been filled with muco-purulent fluid.

The increase in density produced by a thickened pleura can not be differentiated from an equal area of infiltration except by a stereo-roentgenogram. The results of a pleurisy, as localized empyema or pyo and hydro-pneumo-thorax, can be distinctly shown. In one case a superficial area of pneumo-thorax overlay a consolidated and collapsed tubercular lung confusing the physical signs until its presence was detected by the negative. In another case a true hydro-pneumo-thorax of tubercular origin was demonstrated, while in many instances the effect of old pleuritic adhesions was plainly visible in alterations in the curve of the diaphragm.

The relative height of the diaphragm upon the two sides is in a measure an index of the relative capacity of the two lungs, but it is not a constant sign as many other conditions within the thorax vary the relative capacity of the lungs without altering the level of the diaphragm.

Besides the alterations in the lungs and pleura produced by tuberculosis, the Roentgen rays will recognize pericardial effusions and thickenings of tubercular origin.

The relations of the heart and larger blood vessels are often greatly altered by the changes in the lungs. The extent of these alterations has been clearly shown by this method of examination. Not only is the heart drawn over to the affected side by the contracting lung, assisted by the compensatory emphysema, but its axis is also often so altered as to place it in an antero-posterior position. The great blood vessels and other medistinal viscera are also displaced often so far that they lie entirely on the affected side beyond the median line.

Another pathologic change frequently noted in the seventy odd cases recently studied is a calcification of the costo-sternal cartilages. While this may occur from other causes its frequency in tubercular cases is worthy of note.

The re-examination of tubercular cases and the accurate comparison which can be made with former examinations is a feature of great value, as it affords an accurate method of determining the progress of the disease and the efficiency of treatment.

It is thus shown that the Roentgen method of examination is of great value in adding to the knowledge obtained by other methods of physical diagnosis. This is particularly true of the earlier tubercular lesions, especially the deep-seated peribronchial infiltrations and bronchial adenitis. In more advanced cases it adds an element of greater accuracy and detail in localizing the affected areas and corroborates the physical signs, while in all it forms a mechanical method of registering the observations which can be compared with others at a later date.

DISCUSSION.

DR. P. M. HICKEY, DETROIT.

Dr. Leonard's paper gives us additional confirmation of the utility and usefulness of the Roentgen ray in the diagnosis of diseases of the chest. I was glad that the Doctor was rather conservative in the conclusions which he drew and that he did

not consider that all the plates we make are absolutely pathognomonic of the different lesions of the chest. I think that here is a point where we allow our enthusiasm to lead us somewhat astray and that sometimes we draw conclusions which are not always justified. These remarks are intended to apply particularly to the shadows which we find at the root of the lung. Of course we get well-defined areas in other parts of the lung from which we can draw definite conclusions. If we have a definite density around the roots of the lungs, which is produced by chronic inflammation around the bronchi, and not by any increase in the size of the bronchial glands, we can determine the condition present quite definitely, but where we simply have an indefinite shading on each side, and then presume to call it a bronchial gland tuberculosis, we are treading on dangerous ground.

During the past two months I was examining two patients and I ventured to base a diagnosis on the presence of such shadows. Subsequently I employed the tuberculin test, and it was negative. Therefore, I feel that I must be very careful about interpreting these shadows and we should never base a diagnosis of tuberculosis on their presence alone. When we get a well-defined difference in density, we can take greater liberties than when the differences are slight.

DR. ALFRED L. GRAY, RICHMOND, VA.

I would like to ask Dr. Leonard whether he has any explanation to offer concerning the calcification of the costal cartilages in these cases. We undoubtedly have all noticed this calcification, particularly in the costal cartilages of the first and second ribs, and various explanations have been offered, but none have proven satisfactory.

DR. LEWIS GREGORY COLE, NEW YORK CITY.

I am delighted to know that Dr. Leonard has carried on this series of experiments in radiography of the chest in association with clinicians. That is the position we all ought to take. The amount of work we do, diagnostic work, in tuber-

culosis of the chest or in any other condition will prove useful and valuable in proportion as we work with the clinician. We should aim to interest the very best clinicians in this work and go over every case with them as Dr. Leonard has done. Since the last meeting of this Society, I have been doing the same thing with the men in New York, and fortunately I have been able to get men interested who are considered as being head and shoulders above the average diagnostician. Of one of these men Trudeau said that he had the keenest ear of anyone he knew. That man and I carried on a careful series of experiments in these cases. He would make the physical examination, write his diagnosis on a piece of paper, and seal it in an envelope. I made the radiographs, often making a series of them in order to get the greatest detail possible, and then I wrote my diagnosis on a piece of paper and sealed it in an envelope. Then we examined the plates together and compared our diagnoses.

We arrived at the conclusion that the Roentgen ray showed in every case presenting physical signs well-marked tubercular lesions, and in about one case out of four, on an average, he would be unable to detect the least change, whereas the Roentgen ray showed a most characteristic picture. Strange to say, the cases where he failed to corroborate the Roentgen ray findings by physical findings happened to be cases in which the infiltration was most advanced.

Why was that? It was for this reason: The physical signs may be divided into two distinct groups; first, those which are caused by the tubercular inflammation itself. These signs are increased fremitus, dullness, changes in voice and breath sounds, and they are caused by the tubercular deposit—the change in the structure of the lung. They are the signs of tubercular infiltration. The second group are the physical signs which accompany a localized bronchitis, such as a dry or moist râle. That localized bronchitis may or may not be accompanied by tubercular infiltration, at least it may or may not be detected even on the most careful physical examination. In a certain number of cases the tubercular infiltration had advanced to a marked degree before this accompanying bron-

chitis could be detected by physical signs. This divides these cases into two distinct classes of tubercular infiltration, one class in which a bronchitis accompanies the infiltration, and the other in which it does not.

In regard to the point referred to by Dr. Hickey, the lesions showing around the root of the lung, whether we should call those tubercular or not, that is of very great importance. If we see a shadow in a kidney plate, no matter how distinct it may be, we do not say offhand that it is a calculus in the kidney or ureter or elsewhere. Most of us are able to differentiate between the so-called phleboliths and ureteral calculi, and there are many shadows which are distinct and which we do not say are caused by stones in the kidney or ureter. Why therefore, should we, when we find shadows around the root of the lung, throw up our hands and say that we do not take any stock in such things because we find them in cases that are not tubercular? That is true, but there is a difference between the shadows that are and those that are not caused by tuberculosis. The shadows that are caused by tuberculosis present a mottled appearance which is very distinctive, and yet even when such shadows are seen in the plate, it is not right that we should ask the patient to seek another climate but merely tell him that he has tubercular infiltration, which requires certain treatment. Remember, this shadow may be caused by an old infiltration. Bear in mind, however, that if it has the stamp of mottled infiltration which is so characteristic of tuberculosis, whether it is around the root of the lung or in the apex, it is quite likely to be tuberculosis.

DR. KENNON DUNHAM, CINCINNATI.

It is a great advantage to be able to listen to papers that have for their basis work done by the roentgenologist in association with the clinician. The Roentgen examination of the chest is the most important part of our work. It places in the hands of the clinician a very valuable means of diagnosis which is a vital matter to the patient,

In discussing the subject of the diagnosis of diseases of the chest, it is necessary to approach it just as we do any other similar subject. First, you look your patient over, you get his family and personal history, you get your data together, make a careful physical examination, and then a radiographic examination, which brings you to the point of making a differential diagnosis. You eliminate and confirm and to aid you still further, there is at your disposal a tuberculin test. So that the Roentgen ray is of equal value in the diagnosis of these conditions, as are the tuberculin test and the physical examination. One is necessary to the other; neither of them alone is sufficient.

The bronchial glands are enlarged in almost every child that has a cold or adenoids, or some inflammation of the middle ear, and as the glands of the neck are involved, so are the mediastinal glands. It is a simple matter to look at one of these plates and feel that you are dealing with a case of tuberculosis. It simply brings us back to the point where we must admit that we stand greatly in need of a method which will enable us to distinguish between glands that are the seat of tuberculosis, and glands that are not. I hope that Dr. Hickey's plan of using a stereoscopic picture in trying to bring out the thickened vessels and bronchi from the inflammatory tissue surrounding the hilum of the lungs will prove to be what we are after. At any rate, stereoscopy will help us to make a better diagnosis.

Nothing can be of more interest or of more value than the work that is being done in these cases of disease of the chest, but to make a positive statement that this or that thing is wrong simply because we believe it to be so, will do a great deal of harm, and lead to the loss of confidence in our work on the part of the general practitioner. If we can get the general practitioner to cooperate with us, we may be able to solve the problem. They are interested to the same extent that we are. Everyone who is desirous of learning will be able to get much information from the skiagraph of the chest.

Take, for instance, the differential diagnosis of tuberculosis and the chest involvement in grip. The physical signs are almost similar, and yet the skiagraph of a case of influenza fails to reveal any infiltration in the chest; whereas, if that were a tubercular case, showing as many physical signs as it does, the picture would show a process which apparently is of two or three weeks' duration, but which has probably been going on for months and months.

DR. ARTHUR HOLDING, ALBANY, NEW YORK.

This agitation of the tuberculosis question has been productive of much good and has stimulated the Roentgen ray worker to help on the good work. In Albany we have a tuberculosis hospital. We have succeeded in locating many incipient cases of tuberculosis and by doing the radiographic work gratis, I have been able to get the clinicians to listen to me. We have to do this work in exactly the same fashion as we study pathology. When I was a student in the pathological laboratory, the professor in charge would often say that he did not want anyone to make a diagnosis because that was of the least importance. What he wanted us to do was to examine the tissue and describe the conditions present; then if we could base a diagnosis on these findings, well and good. but if we did not, it would not detract from the value of our work. So in making these radiographs, the essential thing is to be able to discover and interpret what is shown. I examine the chest fluoroscopically and in safety by means of the machine devised by Holzknecht, and I think that those of you who have been in my laboratory will agree that it is perfectly safe. In fact, if we expect to see Williams' sign, we must use the fluoroscope.

In the interpretation of a negative there are four points. The first is the difference in shading between the two sides of the chest. The second is the detail at the hilum of the lung. The third, areas of infiltration in the parenchyma, and the fourth point is the difference in the doming of the diaphragm.

I note these points on the report and describe fully what I find. I do not always make a diagnosis, leaving that after the consideration of the results of the physical examination, the history, and of the outcome of the tuberculin test.

MR. H. W. DACHTLER, TOLEDO, OHIO.

I would like to ask Dr. Leonard whether he can differentiate skiagraphically between a tubercular and a syphilitic lung.

DR. GEORGE C. JOHNSTON, PITTSBURG.

Very frequently I am confused by shadows around the hilus of the lung which lead me to suspect a glandular tuberculosis In these cases I temporize and insist that the patient take a little iodide of potassium for a month. Then I take another skiagraph and sometimes I find a remarkable diminution in the condition seen previously, and I insist that the iodide be continued.

Another point I wish to mention is that when you are unable to make a diagnosis of a case of tuberculosis of the lung, but you see a few suspicious shadows and you are certain that the patient is not syphilitic, a few small doses of potassium iodide, about three grains, three times daily, with an examination made on the second day afterward, will convince you beyond a doubt of the existence of a tuberculosis on account of the localized congestion brought about by the iodide of potash Any existing localized bronchitis is usually beautifully accentuated by the iodide and the radiograph will show it up very well. We do not see very many cases of syphilis of the lung in this latitude, but if some of our Southern friends would examine the negro population, which is especially prone to this disease, I am sure they would find many cases of syphilis of the lung. It is impossible to differentiate skiagraphically between the two conditions, syphilis and tuberculosis, so that reliance must be placed on the therapeutic findings.

DR. DUNHAM.

A tuberculin reaction is productive of the same result as iodide of potash. Of course, the iodide is better and easier to give. The tuberculin will accentuate the lesions in a chronic case, both on the plate and on physical examination.

DR. LEONARD (CLOSING THE DISCUSSION).

I would like to say that in the study of these cases I have not attempted in any wise to make a diagnosis of tuberculosis and it was not for the purpose of making a differential diagnosis that I brought out this question. Every case I saw had the physical signs carefully mapped out by a competent clinician after I had made my examination, and I simply made a comparison as to how far the Roentgen ray substantiated the findings of clinical methods. In every case in which I made a diagnosis of tuberculosis, the tubercle bacillus was found in the sputum either before or after my examination. After I had proved the presence of the lesion, they frequently found the bacillus when it had eluded their examinations previously. My cases were all cases of tuberculosis. I have not made any study of syphilis of the lung, nor have I attempted to differentiate between tuberculosis and other conditions. I simply studied tuberculosis.

The calcification of the costal cartilages is something I cannot explain, nor do I believe that anyone else can. Professor Krause, of Jena, spoke to me about this, and out of seventy or more cases that I have seen, seventy-five per cent. showed this calcification in the cartilage of the first rib, but I have seen the same thing in others, even in floating ribs. I do not know what it means.

I do not believe that Dr. Dunham mentioned all the methods of examination which are valuable in the study of tuberculosis. One of the best, one which I hope to have the pleasure of availing myself of in the work I am doing, is the post-mortem examination. I think you will find then the involvement of the glands around the bronchi and in the mediastinum not only in tuberculosis, but in other conditions. The cases I cited

were brought to me as tubercular cases, or with symptoms indicative of tuberculosis, or they were found to be tuberculosis afterwards. I do not pretend to make a diagnosis of tuberculosis from a radiogram; I merely try to show the changes that are taking place in the lungs and glands, but what that change means the clinician and not I must determine.

A PORTABLE PLATE EXHIBIT RACK.

A. L. GRAY, M. D., RICHMOND, VA.

Mr. President and Gentlemen of the Society.

The necessity for a portable plate exhibit rack is familiar to all of us who show our plates at meetings of medical societies, and for convenience I have devised the apparatus which I now present.

To emphasize its portableness, I will say I have brought this from Richmond in the Pullman and on a ferry, carrying it as you see strapped in a bundle, with this shawl strap.

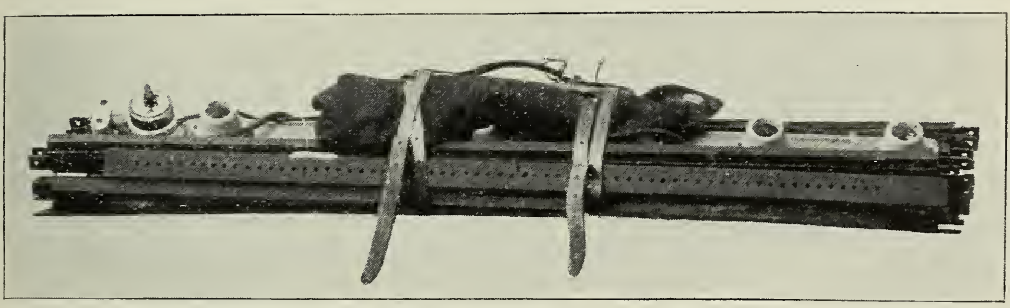
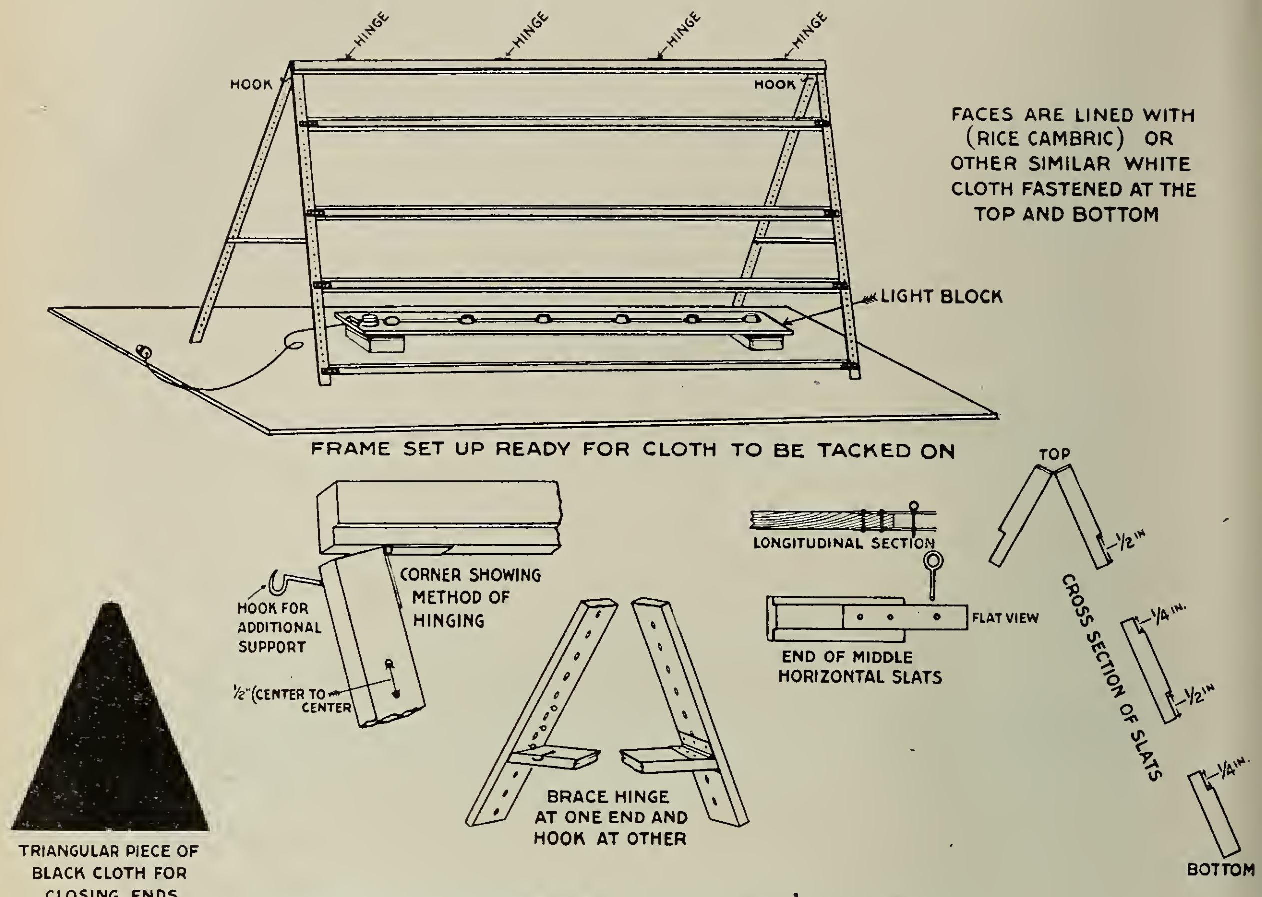


Exhibit Rack Folded and Packed

A great advantage of this cabinet is that it may be made to accommodate any of the usual sizes of negatives from 4 x 5 in. up. The number of plates depends, of course, upon their size. It may be made as long as desired, but its height should perhaps be not over 3 ft., as it would be difficult to light up properly one of greater height.

As you see, the essential frame consists of six slats, the uprights being hinged to the horizontals so that they may be folded on them. The side slats are retained in position by means of slotted ends, which are perforated to admit pins. The uprights have holes drilled in them for the pins, the distance between the centers of two adjacent holes being exactly one-half inch. If the first hole be made at the proper distance from the top horizontal slat, the spaces, when the slats are adjusted, will be found to fit the plates, whatever be their size, and retain them without their falling through. The frame is braced by



DIAGRAMS DESCRIPTIVE OF DR. GRAY'S PORTABLE PLATE EXHIBIT RACK
1909

horizontal slats and the legs are made stable by a horizontal brace, which is hinged at one end to one leg and hooked by the other end to the opposite leg.

The rack is lighted by means of a board, provided with as many light-sockets for incandescent lamps as may be desired, and I think it is well to have on this board a snap-switch. A cord of convenient length with a slip-socket attachment is provided for connecting with the light-bracket.

The sides of the rack are lined with some suitable white material, such as "rice cambric," or other similar fabric, and this is fastened by means of thumb-tacks. The lining should be stretched tightly at the top and at the bottom, but allowed to sag somewhat in the center, so as to prevent the texture of the cloth from being visible through the negative.

The ends of the cabinet are closed by fastening in the same

way to the legs, some opaque black material, which has been cut into the shape of an isosceles triangle.

It may be preferred to cover the slats with a thin strip of wood so as to convert into a groove what is seen here to be a rabbet so that the plates cannot be displaced. I have no trouble, however, with the slats as you see them.

This rack, though it appears slender, has accommodated from thirty to forty plates without the slightest show of unsteadiness. The plates and braces seem to make it remarkably strong.

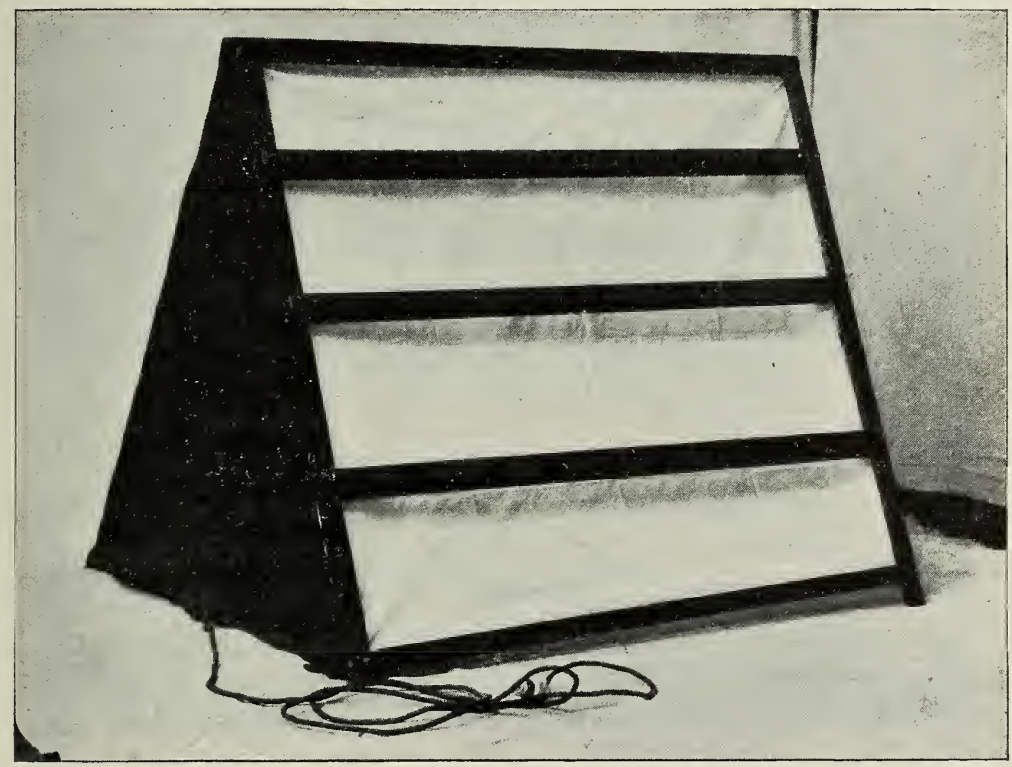


Plate Exhibit Rack of Dr. Gray

I usually carry an additional length of portable cord, so that if the current be not conveniently located, I can obtain electricity in the room best suited for the exhibition, though the light-bracket be in a distant part of the building.

The cost of this device will not exceed $6.00 or $8.00, and it can be made by almost any carpenter.

The cuts give the details of its construction.

312 E. Franklin St.

PRELIMINARY REPORT ON POST OPERATIVE ROENTGEN IRRADIATION FOLLOWING THE RADICAL OPERATION FOR CARCINOMA OF THE UTERUS.

H. W. DACHTLER, TOLEDO, O.
Roentgenologist to St. Vincents and Toledo Hospital.

My attention was first called to this work by Dr. J. H. Jacobson, of Toledo, Ohio, in the summer of 1907. He was then so firmly convinced of the value of the method in carcinoma of the breast that he wished to make use of it in connection with the radical abdominal operation for carcinoma of the uterus.

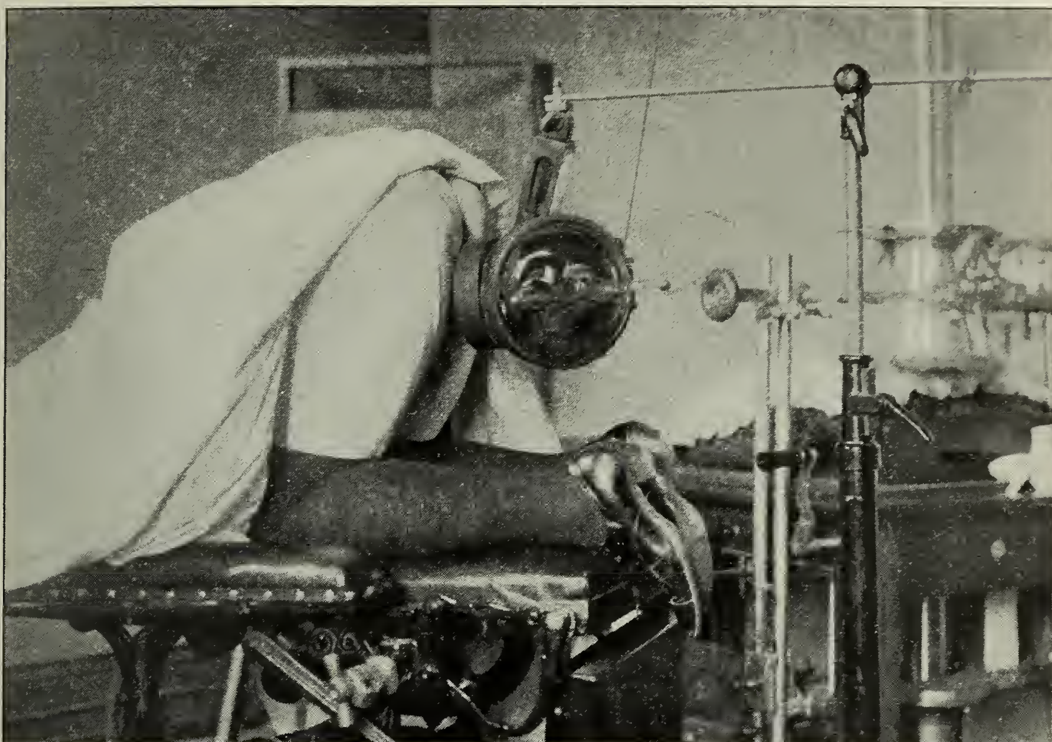
The method employed by Dr. Jacobson is essentially Wertheim's operation with Bumm's modification for quickly locating the ureters in which the vaginal vault is left wide open for the subsequent X-ray treatment. The operation is made under spinal anesthesia to insure complete muscular relaxation and accessibility to the site of operation. Under spinal anesthesia danger from shock is greatly lessened.

Dr. Jacobson asked me to devise methods and perfect a technique that would allow as near direct treatment of the gland bearing areas it was desirous of reaching as was possible and suggested the use of the knee chest position for the patient.

For the treatment to be of any value it was seen that the general principles must follow closely those used in adequate, successful breast work. This necessitated discarding all forms of cavity tubes and using standard tubes that could be carefully tested as to the amount of radiation given off under standard normal conditions of current supply and resistance of tube. My standard conditions conform rather closely to Pancoast's definition of a tube suitable for his method of treating leukemia.

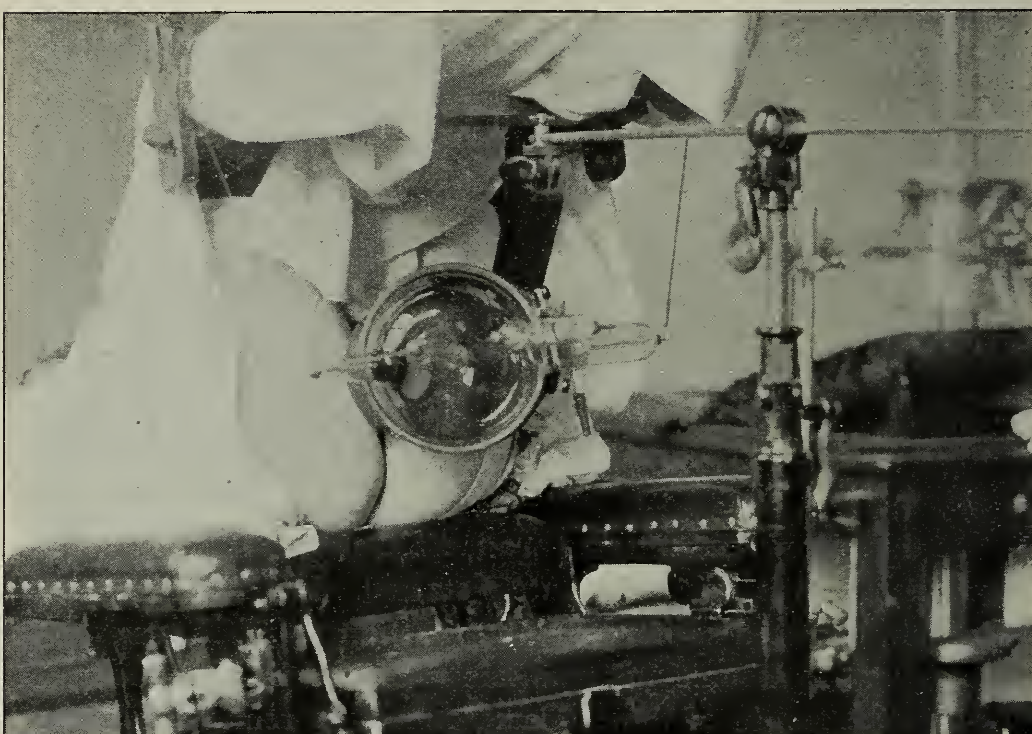
As it was desirous of getting a large cone of rays the use of a speculum of as great a diameter as was possible and of short length was indicated. In addition a tube of small diameter—not over 6 inches—placed close to the speculum helped materially to enlarge the cone. The French tubes of 140 mm.

diameter suitable for use with the Sabourand pastules answer admirably for this work.



At this time a patient was available that was suited for this treatment and it was immediately started. In place of a table a couch was used as it was found that it was much easier for the patient to assume and maintain the knee chest position for a sufficient length of time. Corsets must be removed and the chest lowered as far as possible. This allows ballooning of the vagina and the viscera to gravitate from the pelvis. A Ferguson speculum 1½ inches in diameter and 3 inches long was used. This was passed through a hole in the center of a sheet of protecting material 18 inches square which was fastened by tapes passed around the patient's body. The tube could then be placed in contact with the bell mouth of the speculum which served to center the tube to it. The coil terminals, preferably carried from overhead, were easily adjusted and out of the way. This method had one draw-back—the difficulty of adjusting the speculum at angles to reach as much of the parimetrium as possible. This was overcome in later cases by using

a special tube shield to which a speculum could be attached so firmly that it could be adjusted to quite an angle from the normal direction of the vagina. A small plug of cotton in the speculum prevented any secretion from reaching the Roentgen tube. This shield was so arranged that a leather filter such as used by Pfahler could be inserted between tube and speculum. The knee chest position, at first difficult to maintain, soon becomes endurable.



If treatment is begun soon after operation the patient is best placed on her back with the knees elevated and the legs supported by a strap or rest. An ordinary office chair can be used and the head lowered as much as possible in an exaggerated lithotomy position. The tube and shield are supported in an ordinary tube stand, with the axis of the tube in a horizontal plane. This brings it well out of the way of the feet of the patient.

By observing proper antiseptic measures treatment can be begun in this position on the second day and continued daily while the patient is in the hospital. The lead glass speculi are

easily sterilized and are connected to the tube shield after insertion and the danger of infection eliminated.

In the early treatment it seems advisable to use speculi of different lengths and give both deep and superficial irradiations. This is especially indicated in advanced cases of carcinoma of the cervix and may help to prevent recurrence in the vesical and rectal walls.

At the present time it is difficult to obtain the consent of patients for an early radical operation. The cases treated have all been unfavorable from this standpoint. Notwithstanding this the results have been very encouraging.

A special metal speculum so devised that it can be spread cone-shaped after insertion would aid materially in facilitating the treatment. Several models I have devised have not been satisfactory. As recurrence after the radical operation is slow much time must elapse before conclusions can be drawn. It seems reasonable to expect that this treatment should be as efficient in this location as it is in breast cases.

Mrs. M.———, Age 42, Dressmaker, a patient of Dr. B. C. Slocum, of Toledo, Ohio, who was brought for examination on August 15, 1907, gives the following history:

The patient's father died at the age of 56, from "stomach trouble" associated with great emaciation, mother alive at 80 and well; she has had three children, all living, ages 21-19-17; her labors were all difficult.

Began menstruating at the age of 12, menstruates about every three weeks, profusely, without pain.

Patient states that about two years ago had severe attack of "nervous prostration."

The present illness dates from last December (1906), beginning with a continued profuse bloody discharge. This has continued almost daily up to the present time; of late there has been a foul odor to the discharge. Has been growing weaker for past two months. Patient's usual weight is 127 lbs., there has been no material loss in weight.

Upon examination, there is marked pallor and anemia. A blood examination was not made.

Examination of the heart, lungs, liver, spleen, and abdomen gave negative findings.

Vaginal examination showed an enlarged, nodular, irregular, bleeding cervix, the irregularity apparently limited to the vaginal portion of the cervix. A piece of the cervix was excised and given to Dr. R. P. Daniells for microscopic diagnosis. Dr. Daniells found the disease to be squamous-celled carcinoma of the vaginal portion of the cervix uteri.

The radical abdominal operation after the method of Wertheim was made at St. Vincents Hospital on September 12, 1907, under ether anesthesia. The disease was found to have extended into and infiltrated the right broad ligament, there were no palpably enlarged glands in the pelvis. On account of the infiltration of the right broad ligament the operation was difficult, tedious, and accompanied by severe hemorrhage, the right ureter was freed with difficulty. After the uterus, tubes, ovaries and part of the vagina were removed, some of the infiltrated parametrium still remained. On account of the prolonged operation and hemorrhage, the patient suffered a severe collapse on the table, which necessitated the rapid completion of the operation, with vigorous stimulation. The wound in the pelvis was packed, two clamps attached to blood vessels on right side of pelvis were left in situ, and the abdomen closed and the patient put to bed. The foot of the bed was elevated, continuous saline solutions given by hypermoclysis and per rectum. Patient recovered from her collapse during the first twenty-four hours, the pulse coming down to about 100. The clamps and gauze packing were removed on the second day, and convalesence was somewhat retarded by the appearance of a phlebitis in the right leg, accompanied by persistent swelling.

The X-ray treatment was begun one month after operation and continued uninterruptedly for three months at intervals of two and three days.

The patient gained rapidly in strength and appearance immediately after the operation.

As a small piece of infiltrated parametric tissue (about 1 inch

long and ½ inch wide) was left at the time of operation, the subsequent course of the patient was watched very closely.

On or about March 1, 1908, patient complained of some pain in the right side of pelvis, accompanied by some bloody discharge. A small persistent sinus in the vaginal vault was discovered and an infiltrated area in the right side of pelvis could be felt. It was then thought best to remove this infiltration by way of the vagina, for it seemed to be a recurrence of the disease.

On March 3, 1908, with the ureter catheters in situ, an attempt was made to remove the infiltrated area at St. Vincents Hospital. This, however, could not be accomplished, for the mass was very hard, dense, fibrous, and firmly attached to the side of the pelvis, so as to render its removal impossible.

The X-ray treatment was again resumed and vigorously employed; the slight hemorrhage gradually ceased, and the sinus in the vaginal vault closed.

A recent examination of this patient September 14, 1909, two years after the operation, shows the vaginal vault closed perfectly, no induration or infiltrations are palpable in the pelvis, patient feels well, is gaining in weight and works at her occupation of dressmaking daily.

This case is of particular interest, inasmuch as it gave an opportunity of demonstrating the effect of the ray upon a piece of apparently carcinomatous tissue which had been unavoidably left behind at the time of operation.

DISCUSSION.

DR. HENRY K. PANCOAST, PHILADELPHIA.

Whatever can be done to give relief in carcinoma of the uterus is certainly well worth trying. The rather unsatisfactory results which have followed the use of the Roentgen ray in this condition are in the main due to faulty technic, particularly in the selection of a suitable speculum. So far as I know, there is no good speculum for this purpose. I have used them all, including the Ferguson, but they are all worthless

for this work. If any member of the Society knows of a good speculum, I would like to have him tell us about it.

DR. KENNON DUNHAM, CINCINNATI, OHIO.

The greatest credit is due any man who will give time and thought to this work, and if the surgeon will try to persuade his patient to Roentgen radiation a day or two after an operation of this kind, he too will be doing good.

DR. H. W. VAN ALLEN, SPRINGFIELD, MASSACHUSETTS.

I have treated a number of cases of cancer of the uterus, but unfortunately the patients have died. I felt that the speculum was at fault. Of late I have been using a cavity tube of good proportions, and I have had the manufacturers make a speculum of glass. The end of the speculum is covered with glass which is transparent to the X-ray. In that way a large speculum can be introduced without causing too much pain to the patient. We can easily treat the lower part of the vagina because it falls forward, and the upper portion and the cervical stump can be reached with the speculum. Although the patients I treated died, about a dozen, they were more comfortable. Two of them did very well for nearly a year. Then they stopped taking the treatments and promptly died.

DR. P. M. HICKEY, DETROIT.

While I do not see very many treatment cases, I have had the misfortune of having under my care two very late inoperable cases of carcinoma of the uterus. The cases were so advanced that the surgeons who saw the patients absolutely declined to operate. I was asked to try the Roentgen ray, and I did so, but with a great deal of hesitation. I used the ordinary cavity tube, which generates a very feeble ray at the end. I kept the tube as high as possible during the treatment, and gave frequent treatments. In the first case the amelioration of the symptoms for a considerable period of time was quite

striking. The pain and discharge were lessened, and the patient lived for two years, which the surgeon, who first saw the case, thought was very remarkable.

The second patient has gone on in much the same condition. A prominent gynecologist strongly advised against the performance of a radical operation because of the advanced progress of the case. The patient had been taking an anodyne, but under the Roentgen ray treatment the pain practically disappeared and the anodyne was discontinued voluntarily. The patient's general condition was much improved, so that it must be admitted that in these two cases at least the Roentgen ray was productive of most satisfactory results.

DR. GEORGE C. JOHNSTON, PITTSBURG.

My experience in carcinoma of the uterus has been confined to five inoperable cases. Of course, these five patients are now dead, but they did receive considerable relief from the Roentgen ray treatment. The pain was diminished in every case and I succeeded in making these patients comfortable for some months. They were all bad cases, and I am convinced that in each case the practical impossibility of getting a sufficient quantity of radiation over a wide enough area was the factor which contributed mostly to the failure of the treatment.

It seems to me that the ingenuity of the members of this Society ought to enable someone to devise a proper speculum and a cavity tube emitting an appreciable quantity of radiation where it is needed. In my first case I used a so-called cavity tube, where the cathode stream impinges on the end of the prolongation, and is covered over with a test tube filled with water, a water-jacketed tube. The radiation emitted from this tube was practically nil, and in succeeding cases the attempt was made to throw the rays directly on the parts to be treated through a suitable speculum made of celluloid, glass and metal, but every such speculum had to be discarded eventually. Now, I have not any speculum which can be used to advantage in these cases, which will allow me to cover as large an area as should be treated, and do the patient any good at all.

In one of my cases I attempted to balloon the vagina by means of a small air bag, but as soon as I got the amount of ballooning that seemed necessary, there was a hemorrhage That discouraged me from making any more attempts along that line. It seems to me that a wool tampon might do some good.

DR. D. R. BOWEN, TROY, NEW YORK.

In one of my cases I made use of a method which, although not successful, has not been mentioned. It was impossible to do a complete operation in that case, although the surgeon at first considered it operable. During the operation he found that he could not remove all the diseased tissue without endangering the life of the patient. I tamponned the vagina with wool, making a tight packing, and passed the rays in through that. The vagina was ballooned out considerably, and there was a great deal of surface for exposure, although the result eventually was no better than in any other case. For nine or ten months, however, the progress of the case was held in abeyance, the patient was able to walk to the office, and was practically free from pain. After that, however, the downward course was a very rapid one.

DR. DACHTLER (closing).

I have had just as much trouble with the specula as Dr Pancoast has had. I devised a metal speculum with short arms, with the projection turned at an acute angle, so that when in place in the vagina there was a greater ballooning effect produced. It is extremely difficult to get a speculum made just right, and the one I now use seems to be the best thing so far. If we are going to get results in this work, we must have a tube that will enable us to do just what we want to do, and then stop. We should not carry these cases over too long a time.

My experience has been that the mucous membrane will stand much larger doses of the ray, about twice as much, as are ordinarily given to the skin of the face; you can govern yourself accordingly. In the first case treated the piece of

tissue was excised. Macroscopically it was a telangiectasis of the mucous membrane; microscopically it showed the formation of an embryonic type of blood vessel. Most of the work previously done along this line was for the purpose of giving the patient relief from pain, but if we expect to produce a cure in these cases, we must get the uterus out of the way first. A radical operation will remove nearly all, if not all, of the carcinomatous tissue. I have had six cases under treatment for a year or more, and all of the patients are well, except two, who have had a recurrence.

It was with the object of destroying the glands and the lymphatics of that region where recurrences ordinarily take place, that this treatment was devised. With the body of the uterus in place, you cannot get enough energy to do the work In one case I treated the vaginal vault was left open, and I inserted the speculum too deeply. A recurrence took place in the bladder wall, which remained localized for nine months.

ADDRESS BY THE PRESIDENT

DR. GEO. C. JOHNSTON, PITTSBURG, PA.

The presidency of the American Roentgen Ray Society is the highest honor that can be attained by any Roentgenologist. The duties of the office are manifold and the delivery of an address at the annual meeting is the most onerous. Such an address should cover the entire field of Roentgenology and call attention to the advances of the year in every direction; and such an address is beyond the powers of your unworthy president. I shall therefore devote the time allotted to me to a consideration of a few matters that have to do with the welfare and progress of the Society and its members.

The Roentgenologist is usually a beloved crank. Few of them have any business sense, and the calling is so fascinating that they tear themselves with difficulty from the worship of the tube to sit down and loaf and invite the soul. Considerations of finance, policy, and protection are neglected for the more inspiring study of technic and interesting readings of each new hidden mystery in the negative.

Already medicine and surgery are indebted to the pioneer Roentgenologists far beyond their powers of repayment. The Roentgen Ray is today, in the hands of the expert, the greatest diagnostic agent possessed by medicine. Is the Roentgen worker receiving his just share of the emoluments of the profession? I think not.

First, you will admit that the dangers of this branch of medicine braved by the operator have not been exaggerated. The insurance companies are beginning to look upon us as undesirable risks. There is no need to rehearse here the actual peril which is about every man who spends much time in a Roentgen laboratory. In other walks of life positions of danger are highly paid in proportion to the danger and the skill required to perform the work. There is no branch of surgery requiring higher skill or more exacting technic than that necessary for success in Roentgenology, and in addition

there is no work in either which is so dangerous to the operator. Obviously, then, the Roentgenologist should be the highest paid man in the profession, but he is not.

Again, no professional man is required to make such expenditures for equipment or to maintain such a large and constantly accumulating scrap pile as we are. The apparatus of today is obsolete tomorrow. There is a constant race between our pocketbooks and the inventive genius of the up-to-date manufacturer.

And last, and most painful of all, the work is appreciated by about one physician in three hundred and fifty.

Just the other day I received a reprint from a prominent surgeon, who stated in all gravity that he had decided that the Roentgen Ray was a diagnostic agent in calculus ureteritis.

On the brighter side, however, are those up to the minute surgeons and physicians who instead of gravely coming in to look at a plate and holding it upside down, want diagnoses, and accept them at par value.

Since we are denied many of the things which go to pay in part for professional endeavor, we should look a little more to our own interests. The average Roentgenologist does not charge enough for his services. The public appreciate a thing by the price tag. The low standard of fees set by the general profession is to blame for much of this. The general practitioner sees the Roentgenologist charge fifteen or twenty-five dollars for an examination, when he is accustomed to spending a night at a labor case for ten dollars, and he demurs. He fails to see that every man who pays a good fee to a specialist, appreciates all the more the value of medical services.

The education of the profession and the public to expect diagnoses instead of pictures from the Roentgenologist is progressing slowly. The sooner we cease making prints from our negatives, the quicker will this education be complete.

The keynote of success in our work is careful, exact procedure. One incorrect diagnosis made from the study of plates not up to the standard, will more than offset a year of good work in the minds of an operator's clientele.

Radioscopy is coming into vogue rapidly, and much good and much worthless work is being done in this important line. Many of the men who have taken up the screen with a rush, will lay it down with a sigh. Protection of the most exacting kind is here necessary, yet seldom employed. It seems that the sad warnings with which we are so familiar, have been sounded in vain. The fallacy that a ray from a tube excited by a static machine is harmless, is still alive, in spite of the deaths from carcinoma of the two chief supporters of this grievous error.

The American Roentgen Ray Society is in good condition, but we are not increasing in size as rapidly as would seem proper from the great increase in the number of Roentgenologists in this country. This may be well, but the Society is showing a constant deficit, and either the membership roll or the dues must be increased.

There is no journal devoted to Roentgenology published in this country, and this should be a constant reproach to the members of the Society. I would suggest the appointment of a committee to take up a proposition to publish a journal devoted to this subject; the Society agreeing to furnish the material, and the election of an editorial committee to supervise the journal.

The publication of the Transactions should be undertaken immediately following the meeting, and they should be in the hands of the Society within three months. This is almost impossible, and cannot be done if proof is sent to each member and cuts are made, unless each paper is in the hands of the Secretary at the close of the meeting.

The time and place of meeting should be decided upon before the close of each meeting.

A committee on scientific program should be appointed by the president, which committee should outline a program and obtain papers on a wide scope to cover the entire subject of Roentgenology. This work should be done early in the year, so that each man should have plenty of time to prepare his paper.

A manufacturers' association, composed of the makers of apparatus, should be formed, which association should have an open meeting at the annual session, where new apparatus could be demonstrated and explained before the entire Society. Each year new devices are shown in our exhibit, the significance of which is lost to many of us from lack of such complete demonstration and exhibition.

One of the best ways of keeping up to date in our work is to see how the masters of the art work; hence I would suggest that an annual pilgrimage be inaugurated. Thus, if the Society were to meet in Detroit, Drs. Hulst, Crane, and others in that vicinity should arrange to be at home to the members on certain days before the meeting, and have everything in their laboratories ready to show. These pilgrimages would prove most instructive to those able to attend.

The discussion is always the most valuable part of the meeting, and as we have plenty of time for all the papers, I trust that it will be full and complete. There are many of our members who never take the floor unless specially listed, or only when called upon by the chair. Often subjects are under discussion where the experiences of the most humble of us may be worth more than the theory of the most prominent, therefore do not hesitate to join in the discussion of any subject where your experience may prove helpful and enlightening.

Your president wishes to thank you for the high honor conferred upon him, and we will now proceed with great interest to the scientific program.

AMERICAN ROENTGEN RAY SOCIETY.

Minutes of the Tenth Annual Meeting, held in Atlantic City, N. J., Sept. 23-25, 1909.

First Day—Morning Session.

The Society convened in Haddon Hall, and was called to order by the President, Dr. George C. Johnston, of Pittsburg, Pa., at 10 o'clock.

The Secretary, Dr. Percy Brown, of Boston, read the minutes of the previous meeting, which, on motion, were approved as read.

In furtherance of the action taken by the Society, at the Cincinnati meeting, in 1907, Dr. F. H. Baetjer moved the suspension of the publication of the Transactions and the publication of an official journal, to be issued quarterly or otherwise, as the Publication Committee would decide. This motion was seconded by Dr. Pancoast and was carried unanimously.

Dr. Pancoast then asked permission to withdraw his motion to table the matter of raising the dues made at the previous meeting (New York, 1908), and was permitted to do so. Dr. Kennon Dunham then moved that the annual dues of the Society be raised to **ten dollars.** Seconded and carried.

The Secretary then read his annual report, which, on motion of Dr. Baetjer, was accepted.

SECRETARY'S REPORT.

It occurs to the Secretary that his report may properly be divided into the question of Society membership, and a few remarks about the annual Transactions. He is pleased to note that, although not many applications have been made for membership, the majority of those received have come apparently from men who were more than passingly interested in the status of the Roentgen Rays today. In many instances, these applications have come from men who have already done some

work with the rays, both experimentally and clinically. This experience enables them at once to become more useful members to the Society than they would be if they had but a rudimentary smattering of the principles of the art. Two of the applications, the Secretary notes, come from gentlemen resident in the Dominion of Canada. This is well, as it will extend our influence beyond the northern border of our country into a region where a great deal of the most excellent medicine is being practised. It also carries our influence into that portion of the continent where there is said to occur a certain type of endemic disease,—to wit, the occurrence of urinary calculus in the Maritime Provinces. The Secretary believes that the study of urinary calculus with the Roentgen Rays is yet in its infancy, and much good work, therefore, should be accomplished by our new members, who are fortunately situated where this affection is apparently endemic. From the character of the communications received by him, especially certain epistles from foreign parts the Secretary believes that the serious energies put forward by our members to uplift and maintain the character of American Roentgenology is being appreciated and respected abroad. This respect and appreciation comes from foreign scientists, many of whom themselves are in the extreme skillful as Roentgenologists; therefore, if straws show which way the wind blows, their attitude toward us is all the more flattering.

The Transactions for 1908.—The Secretary, who was this year appointed editor of the Transactions, has already, without intending to make undue excuses, attempted to explain certain of the causes of its late appearance. He appreciates as well as anyone how annoying this late appearance must be to those who so generously took part in last year's meeting, and especially so to our former President, whose efforts did so much to make the meeting in New York such a success. He wishes to add, however, that in addition to the unavoidable handicaps met with, which were outlined to you in a short circular, he has been encumbered by his inexperience in editing a similar volume heretofore. In the light of this experience, of which he now is the well-seasoned possessor, he would respectfully ask

that in future members who wish the Transactions to appear as soon as is possible, would make it a point to be models of punctuality in returning copy of corrected discussions. As an acute example of what these little delays mean, he would mention, in passing, the fact that a certain member's corrected discussion was finally received from him in the month of July, 1909, for publication in the Transactions of the Society for 1908. As about this time the printing presses were running merrily, the delay on the part of this member caused his tardy discussion to suffer the punishment it deserved.

The first portion of this report is, then, proudly, the latter portion, penitently, and the whole, respectfully submitted.

PERCY BROWN,
Secretary.

The Treasurer, Dr. Charles F. Bowen, read his report, which, on motion of Dr. Pancoast, was accepted.

TREASURER'S REPORT.

Report of the Treasurer from Dec. 28, 1908, to Sept. 23, 1909.

Dec. 28, 1908, balance on hand	$ 384.05
Membership dues	635.00
Exhibitors,—New York Meeting	594.00
Total	$1613.05

Expended

F. C. Zapffe	$ 50.00
Geo. C. Johnston	25.00
L. C. Cole	46.20
Tehrune Catering Co	75.00
The Astor Press	3.75
P. M. Hickey	40.50
J. W. Lieb	232.07
F. C. Zapffe	100.00
Marion White, (Sten.)	74.25
R. H. Sayre	77.50
J. W. Travell	25.00

Nitske Bros. Printing	6.00
Terry Eng. Co.	12.55
E. L. Auld Co.	59.65
C. F. Bowen, (expenses for two years)	171.36
Total	$998.83
Total collected	$1613.05
Total expended	998.83
Balance on hand	$ 614.22

CHAS. F. BOWEN,
Treasurer.

On motion of Dr. P. M. Hickey, seconded by Dr. Dunham, a rising vote of thanks was tendered the Treasurer for his very efficient services.

Dr. E. H. Skinner moved the appointment of a committee of three to draft a scheme for the publication of the quarterly journal, said committee to report on the morning of the second day. The motion was carried.

The Chair appointed on this committee Drs. E. H. Skinner; F. H. Baetjer and P. M. Hickey.

There being no further business to come before the Society at this time, the scientific program was proceeded with, and Dr. Sidney Lange, of Cincinnati, Ohio, read the first paper entitled "X-Ray Examination of the Mastoid Process."

The paper was discussed by Drs. E. W. Caldwell, Charles F. Bowen, Willis F. Manges, George E. Pfahler, George C. Johnston, and in closing by Dr. Lange.

Dr. Percy Brown, of Boston, read a paper on "The Relation between Bodily Deformity and Gastro-Intestinal Irregularities: A Roentgenologic Study."

The paper was discussed by Drs. George E. Pfahler, Charles M. Hazen, and Dr. Brown.

Dr. Baetjer, Chairman of the Executive Committee, reported that a number of applications had been received, acted on by

the Committee, and turned over to the Secretary. The Secretary read the following applications, on which favorable action was taken by the Executive Committee:

Howard E. Ashbury, M. D., Baltimore, Md.
Alex. P. Bergman, M. D., New Haven, Conn.
L. Gordon Brown, M. D., Colorado Springs, Colo.
Albertus Cotton, M. D., Baltimore, Md.
Edw. S. Hatch, M. D., New Orleans, La.
Edward Herbert, M. D., Fall River, Mass.
Edw. Leaming, M. D., New York, N. Y.
R. O. Meisenbach, M. D., Buffalo, N. Y.
Wm. H. Mick, M. D., Omaha, Neb.
C. M. Peabody, D. D. S., So. Orange, N. J.
Chas. J. Search, M. D., Brooklyn, N. Y.
W. H. Stewart, M. D., New York, N. Y.
Edw. C. Titus, M. D., New York, N. Y.
Robert Wilson, M. D., Montreal, Que.
Fred. C. Zapffe, M. D., Chicago, Ill.

On motion of Dr. Dunham, the Secretary was instructed to cast the ballot of the Society for the election to membership of the above-named applicants, which he did.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION.

The Society reconvened and was called to order by the President at 2 o'clock.

Dr. George E. Pfahler, of Philadelphia, contributed some notes on "The Roentgen Laboratories of Europe."

The paper was discussed by Drs. H. W. Van Allen, Arthur Holding, W. H. Dieffenbach, D. R. Bowen, Charles Lester Leonard, and in closing by the author.

Dr. H. K. Pancoast, of Philadelphia, followed with a paper on "X-Ray Diagnosis of Achondroplasia and Cretinism," which was discussed by Drs. Chas. Lester Leonard, P. M. Hickey, J. W. Hunter, L. G. Cole, and in closing by Dr. Pancoast.

Dr. P. M. Hickey, of Detroit, contributed a paper on "Stereographic Radiography of the Chest."

The discussion on this paper was opened by Dr. E. H. Skinner, and continued by Drs. C. L. Leonard, H. K. Pancoast, E. W. Caldwell, and closed by Dr. Hickey.

Dr. Charles Lester Leonard, of Philadelphia, read a paper on "The Roentgen Diagnosis of Pulmonary Lesions."

The paper was discussed by Drs. P. M. Hickey, A. L. Gray, L. G. Cole, Kennon Dunham, Arthur Holding, H. W. Dachtler, George C. Johnston, and closed by Dr. Leonard.

The Chair here appointed the following Auditing Committee: Drs. Stewart, Lawrence, and Vail.

The Society then adjourned until Friday, at 10 A. M.

Second Day—Morning Session.

The Society reassembled at 10 A. M., and was called to order by the President, Dr. Johnston.

The President announced that the time and place of the next meeting were now open for discussion. Dr. Hickey extended an invitation to meet in Detroit, and Dr. Gray invited the Society to meet in Richmond, Virginia. These invitations were referred to the Executive Committee for action.

Dr. W. H. Dieffenbach asked for permission to speak on the question of personal privilege, which was granted. He protested against the curtailment of the paper which he presented to the Society at the last annual meeting, and which was published in the Transactions in very abbreviated form. He claimed that much valuable material had been omitted, and that the paper in the form as published was incomplete.

The Secretary stated on his behalf that, owing to the length of the paper and the fact that a considerable part of its contents was general and did not have any special reference to Roentgenography, the paper was submitted to the Board of Censors. The President of the Board directed that only such portions of the paper as dealt with the use of the Roentgen Ray should be published, which was done.

Dr. Pfahler then moved that in the future all changes deemed necessary in an original article to permit of its publication be submitted to the author for approval. The motion was seconded by Dr. Dieffenbach and carried.

The Chair here appointed the Nominating Committee, consisting of Drs. Van Allen, Holding, and E. H. Skinner.

Dr. E. H. Skinner, Chairman of the Special Committee on Publication of a Journal, presented a report, which, on motion of Dr. Hunter, was adopted.

REPORT OF COMMITTEE ON QUARTERLY.

Your Committee on the Quarterly has considered at length the various phases of the manner of publication of the official organ of this society and would commend to your attention the following suggestions:

1. That the publication be known as "The American Quarterly of Roentgenology," the official organ of the American Roentgen Ray Society.

2. That it be published on the first of December, March, June and September, the dates being selected so as to place the completed program in the hands of the members on the first of September, prior to the annual meeting.

3. That the membership fee be split into two portions; $5.00 to be applied to the running expenses of the Society and $5.00 to the Quarterly fund as the members' subscription to the Quarterly, this latter proviso being necessary to accord with the present postal laws. The subscription price to non-members shall be $5.00 per annum.

4. That the Publication Committee appoint the Editor-in-Chief, the said Publication Committee to be nominated by the Nominating Committee at the annual meeting in conjunction with the other officers, and the power of the Publication Committee over the Editor to cease with his appointment, except in an advisory capacity. That the Treasurer of the Society be the Business Manager of the Quarterly.

5 That the American Roentgen Ray Society do now incorporate as a body in order that the Editor-in-Chief be relieved of the embarrassment of any financial emergency, such as printing contracts, etc.

6. That contributions be received from non-members of the Roentgen Ray Society.

7. That special discounts be granted to manufacturers who will both advertise and take space in the exhibit at the annual meeting.

8. That provision be made for the expenses of the editorial officers for stenography, mailing, etc.

9. The last suggestion that the Quarterly Committee would respectfully bring to your attention, while not legitimately within its province, is logically the outcome of the previous suggestions; namely, that the By-Laws be so amended or revised that the preceding suggestions may be incorporated in the Constitution of the Society.

Respectfully submitted,

P. M. HICKEY,
F. H. BAETJER,
E. H. SKINNER.

Dr. W. H. Dieffenbach, of New York, contributed a paper on "Differential Diagnosis of Disease of Bone by the Roentgen Method."

The paper was discussed by Drs. Percy Brown, F. H. Baetjer, H. K. Pancoast, George E. Pfahler, L. G. Cole, Kennon Dunham, Charles Lester Leonard, Hammond, George C. Johnston, W. S. Lawrence, Charles M. Hazen, and in closing by the author.

The Chair here appointed the following committee on Revision of the Constitution and By-Laws, the committee to report before final adjournment: Drs. P. M. Hickey, F. H. Baetjer, and E. H. Skinner.

Dr. A. J. Gray, of Richmond, Va., read a paper on "Technic in Calculus Diagnosis," and demonstrated a portable plate exhibit rack.

On motion, the discussion on this paper was deferred until the afternoon session.

The Auditing Committee reported that the books of the Treasurer had been duly audited and found to be correct. On motion of Dr. Pfahler, the report was accepted and the committee discharged.

The Society then adjourned until 2 o'clock.

Afternoon Session.

The Society reassembled at 2 o'clock, and was called to order by the President.

The postponed discussion on Dr. Gray's paper was opened by Dr. Charles Lester Leonard, continued by Drs. L. G. Cole, M. K. Kassabian, George C. Johnston, Sidney Lange, Percy Brown, and closed by the essayist.

Dr. L. G. Cole, of New York, then read a paper on "Speed Mania in Radiography."

The paper was discussed by Drs. P. M. Hickey, George E. Pfahler, E. W. Caldwell, V. J. Willey, M. K. Kassabian, D. R. Bowen, Percy Brown, Charles Lester Leonard, George C. Johnston, and Dr. Cole.

On motion, Dr. P. M. Hickey read a paper on "X-Ray Work in Hospitals," prepared by Dr. Rollin H. Stevens, of Detroit, who was unable to be present.

Dr. C. M. Peabody, of South Orange, N. J., contributed a paper on "Some Experiments and Conclusions in the Exact Measurement of the X-Ray."

This paper was discussed by Drs. E. W. Caldwell, George E. Pfahler, H. W. Dachtler, H. C. Snook, and by the essayist in closing.

On motion, the Society adjourned until 8 P. M.

Evening Session.

The Society reassembled at 8 o'clock, and was called to order by the President.

Dr. D. R. Bowen, of Rome, N. Y., contributed a paper entitled "A Few Laboratory Helps."

The paper was not discussed.

Dr. M. K. Kassabian, of Philadelphia, considered "Roentgen Ray Dermatitis; Its Prevention and Treatment."

This paper was discussed by Drs. F. H. Baetjer, D. R. Bowen, W. S. Lawrence, Cotton, Geo. C. Johnston, and in closing by Dr. Kassabian.

On motion, Dr. Carl Beck's paper, entitled "The Roentgen Treatment of Basedow's Disease and its Results," was read by title and ordered published.

The Society then adjourned until Saturday morning at 10 o'clock.

THIRD DAY—MORNING SESSION.

The Society reassembled and was called to order by the President at 10 o'clock.

The Executive Committee reported that Detroit had been selected as the next place of meeting, the time for such meeting to be decided on by the Committee later.

On motion, this report was accepted.

The Nominating Committee reported as follows:

President—George E. Pfahler, of Philadelphia.

Vice-Presidents—Vernon J. Willey, of Rochester, Minn.; C. E. Coon, of Syracuse, N. Y.; Russell D. Carman, of St. Louis; and Roland Hammond, of Providence, R. I.

Secretary—Percy Brown, of Boston.

Treasurer—Charles F. Bowen, of Columbus, Ohio.

Executive Committee—P. M. Hickey, of Detroit.

Publication Committee—F. H. Baetjer, of Baltimore; E. W. Caldwell, of New York, and Sidney Lange, of Cincinnati.

On motion, this report was accepted, and the Secretary instructed to cast the ballot of the Society for the election to office of those named in the report, which he did.

On motion of Dr. Hickey, the Board of Censors was authorized to remove from the roll of membership the name of T. M. Woodhouse, of Toronto, Canada, if the Board found that the charges preferred against him were correct.

The Board also called attention to the fact that certain manufacturers who have been represented in the exhibit at the annual meetings of the Society are engaged in diagnostic radiographic work. The Board recommended that these manufacturers be informed that the Society does not approve of such

a procedure, and that no invitation be extended to them to exhibit at any meeting of the Society until this matter has been adjusted satisfactorily.

On motion of Dr. Dunham, the Secretary was instructed to transmit to these manufacturers the action of the Society in regard to this matter.

Dr. Pancoast moved that the necessary steps be taken looking toward the incorporation of the Society.

On motion of Dr. Skinner, Dr. Pancoast's motion was tabled.

Dr. Arthur Holding and Dr. Kennon Dunham each contributed a paper on the "Treatment of Tubercular Cervical Adenitis with the X-Rays."

The discussion on these papers was opened by Dr. E. H. Skinner, and continued by Drs. Charles Lester Leonard, J. W. Hunter, H. W. Dachtler, D. R. Bowen, Geo. C. Johnston, and closed by Drs. Holding and Dunham.

Dr. H. W. Dachtler, of Toledo, Ohio, contributed a paper entitled "Roentgen Treatment following the Radical Operation for Cancer of the Uterus."

The paper was discussed by Drs. H. K. Pancoast, Kennon Dunham, H. W. Van Allen, P. M. Hickey, George C. Johnston, D. R. Bowen, and in closing by the essayist.

The Publication Committee announced the selection of Dr. P. M. Hickey, of Detroit, Michigan, as Editor of the official journal. On motion, this report was accepted.

There being no further business to come before the Society, the motion was carried extending a vote of thanks to the management of Haddon Hall for courtesies shown to the Society during its meeting.

The Society then adjourned.

GEORGE C. JOHNSTON, President.
PERCY BROWN, Secretary.

EDITORIAL.

Owing to the very serious illness of Dr. Hickey the editorials that should have appeared in this number are omitted.

Following is the announcement of the committee on arrangements for the 1910 meeting. The early announcement of the time and place of this meeting will allow ample opportunity for all who desire to attend to plan accordingly.

Arrangements for the 1910 Meeting.

The committee on arrangements met at the Hotel Cadillac, December 6, and decided this hotel offered the best advantages for our 1910 meeting. In fact the committee is quite enthusiastic over the accommodations which suit our requirements so well. The meetings, manufacturers' exhibit and plate exhibit can all be held under one roof with ample room for all.

First of all the Cadillac Hotel is first class in its appointments, service and cuisine. It is comfortable and home-like, and the management will do everything in its power to make its part in the meeting a success.

The meeting room is on the second floor away from the noise of the street. It has a high skylight and several windows next the alley, thus affording good ventilation. The skylight will be darkened for us when we wish to use the lantern. It will seat 400 people.

Adjoining this room and connected with it by a door is the Flemish Room—an L-shaped room 35 feet by 18 feet at one end, and 12 feet at the other end. This is admirably suited for a **Plate Exhibit room.** Additional room for this purpose may be had if needed in a short hall at one end of the room.

On the ground floor adjoining the lobby is the large Turkish Room, connected with the lobby by three large sliding doors. This room is oblong, 55 feet by 27 feet. It will be used for the Manufacturers' Exhibit. It could scarcely be

better situated, and will afford ample space. If we need more, however, we may have a part of the lobby adjoining, used as a writing room.

The committee decided to encourage the plate exhibit in every way possible. Mr. Dachtler has charge of it. The committee will be able to exhibit plates of any size and number from lantern slides to the 14x17 size. The exhibition of lantern slide reductions will be made a feature of this meeting. The committee will also encourage the exhibition of prints from interesting plates.

The manufacturers are promised all the current they want. A plant in the building supplies direct current at 118 volts and plenty of it. The Edison Co. have a station adjoining the hotel and can supply more if we need it. They will have all the space they require, and they can go away at night and during sessions and leave everything safe behind lock and key. The committee desires to receive suggestions from the manufacturers, and will endeavor to please them in every way possible.

September 29th, 30th and October 1st have been selected for the meeting. This will allow members attending to return home before the opening of the college year.

Plan now for the 1910 meeting.

R. H. STEVENS,
Chairman.

The first of a series of X-ray plates covering the gastro-intestinal tract. Patient had just swallowed about 20 fluid ounces of bismuth mixture. Exposure about 3 seconds during suspended respiration, patient standing. The white shadow shows the bismuth mixture which fills the dependent portion of the stomach and the pyloris. The dark area above the level of the bismuth is due to gas inflating the cardiac portion of the stomach (the "magen-blase"). A portion of the stomach wall appears as a light line enclosing this light area. It will be seen that the greater curvature extends well below the level of the crests of the ilia.—E. W. Caldwell, M. D.

ABSTRACTS.

A BRIEF REVIEW OF THE APPLICATIONS OF THE ROENTGEN RAYS IN DIAGNOSES.

BY E. W. CALDWELL, M. D., NEW YORK CITY.

(Abstracted from a paper read before the New York State Society.)

Although brilliant radiographs of wrists, hands, elbows and teeth may be made by almost any amateur, the successful use of the X-ray for diagnosis in the thicker parts of the body and especially in the urinary tract, the gastro-intestinal tract, the thorax and the nasal sinuses has been attained by comparatively few men who have spared neither pains nor expense in perfecting their technique. The very great difference in the cost of making an X-ray examination of a simple subject like a wrist or hand and of a difficult one like the gastro-intestinal tract, is seldom appreciated. One of my colleagues tells me that his outlay for tubes and plates in such an examination as the one last mentioned averages at least $25.00 for each case.

The Roentgenologist of to-day practices one of the most difficult, dangerous and unremunerative of medical specialties, but the stigma of the bell-hanger's X-ray picture shop still clings to him. Strangely enough, although there are few if any legal restrictions, the practice of the art by those without medical training has almost died out except in some of the hospitals in our largest and least progressive American cities.

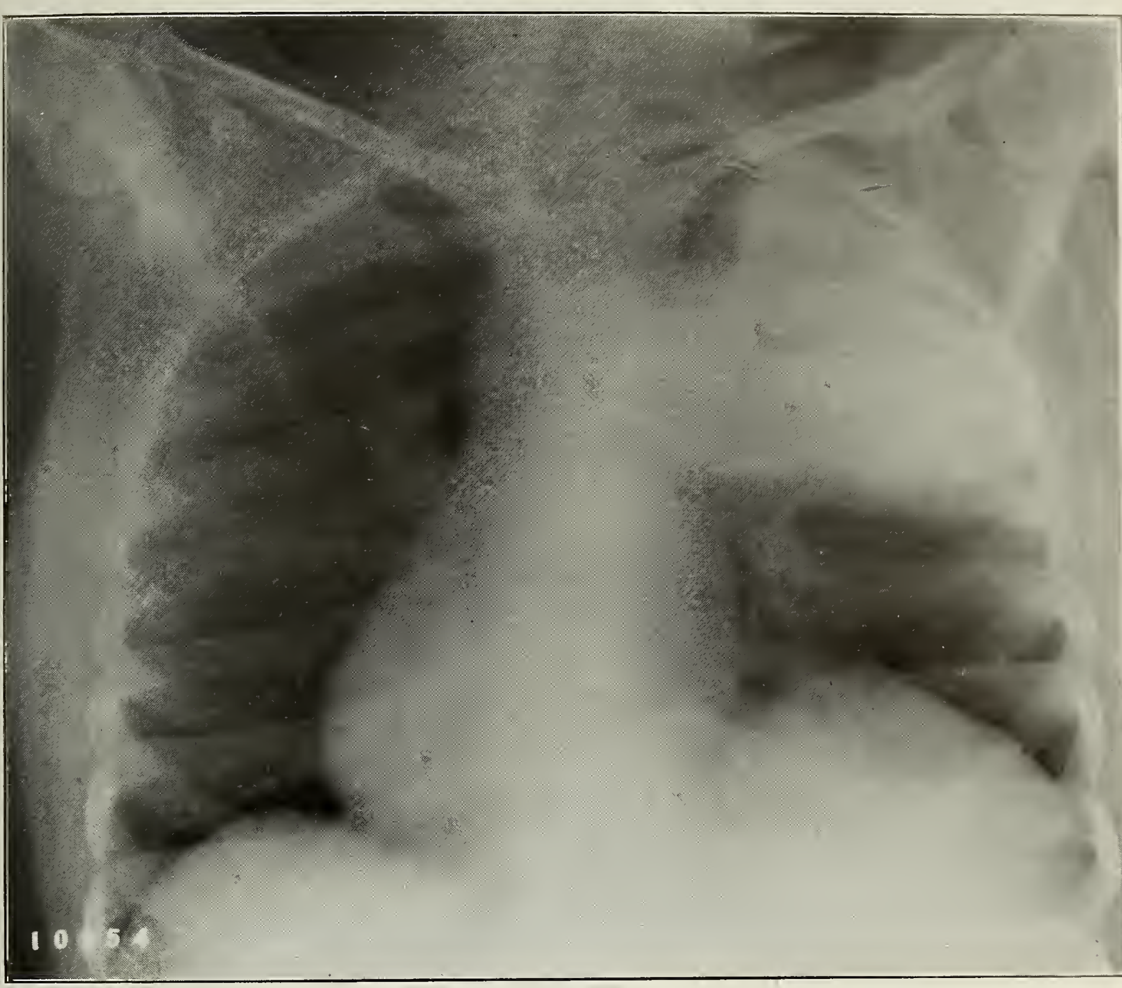
The almost ineradicable impression that the radiograph is a picture or a photograph which any one may properly examine, interpret and criticize, has been a great hindrance to the progress of Roentgenology and to its proper recognition.

The radiograph is in fact not a picture or even a photograph, except in the sense that photographic materials are used in its production. It is a special kind of projection and is essentially more like a slide for the microscope than a photographic view. Unfortunately it may so much resemble a photograph that laymen and medical men alike are apt to regard it as a view and not suspect how incomplete and even how dangerous their over-confident interpretations of it may be.

The mere operation of an X-ray outfit is becoming much easier with improved appliances, but the number and the cost of the necessary appliances have increased enormously. In the present state of the art expensive tubes must be sacrificed in order to obtain the best radiographic work in difficult cases. The cost of replacing these tubes amounts in some good laboratories to more than fifteen hundred dollars per year, and this with the cost of new appliances that must be added from time to time to replace those which become obsolete, are important items in the maintenance expenses of an up-to-date equipment. Such expenditures as these may, of course, be avoided if one is content with mediocre results, or if he does not undertake the difficult cases.

The Roentgenologist who would excel must provide himself with the best possible equipment; he must acquire skill in the technique of using it; he must be painstaking in his observation of the plates, accurate and not over-enthusiastic in his interpretation of them. His opinion should be valued rather than his so-called X-ray pictures.

The somewhat spectacular features of Roentgen diagnosis have attracted to it a few prolific writers whose accounts of miraculous results are not worthy of confidence, but there are in the field many earnest scientific men who are devoting their lives to making Roentgenology more and more useful to the healing art, and who deserve the respect and co-operation of their colleagues in medicine and surgery.



Interlobar abscess. The light shadow in upper right side of plate was produced by pus between upper and middle lobes of right lung, and walled off by adhesions. An accurate diagnosis had been made from the symptoms and physical signs alone. This diagnosis was confirmed by the X-ray and later by operation and autopsy.—E. W. Caldwell, M. D.

Pyelo-nephritis with dilatation of upper portion of ureter. A 20 per cent. solution of Argyrol was introduced into kidney pelvis through ureteral catheter. The silver solution is relatively opaque to X-rays and therefore produces the light shadows to the right of spine, outlining the dilated ureter and some of the calices of kidney. — E. W. Caldwell, M. D.

IMPROVED APPARATUS FOR LOCALIZING FOREIGN BODIES IN THE EYE-BALL BY THE ROENTGEN RAYS.

BY WILLIAM M. SWEET, M. D., PHILADELPHIA, PA.

(Abstracted from American Ophthalmological Society Transactions, 1909.)

In the new apparatus the planes of shadow of the foreign body are accurately determined by the instrument without the necessity on the part of the operator of taking measurements from the plates or in drawing lines on the chart. The tube-holder, indicating ball, and plate-holder are upon a movable stage, and therefore preserve a known relation to each other, which does not vary. The angle of the rays with the eyeball and the distance of the tube from the plate are always the same, so that one indicator is sufficient, and this consists of a small steel ball supported in a ring of transparent celluloid. The setting of this ball opposite the center of the cornea is made by means of adjusting screws conveniently placed on the frame of

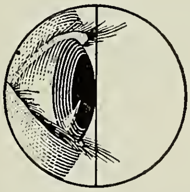


Fig. 3.—Image of cross-wire and cornea.

the instrument. Accuracy in the measurement of the distance of the indicating ball from the center of the cornea is secured by means of a telescope and reflecting mirror. The mirror gives an image of a cross-wire and a lateral image of the cornea. Through the telescope the observer adjusts the instrument until the image of the cross-wire is in direct contact with the image of the summit of the cornea. (Fig. 3.) When the adjustment is made, the indicating ball is exactly 10 mm. from the center of the cornea. A miniature incandescent lamp, mounted in an adjustable shade, illuminates the side of the nose of the patient, insuring a well-lighted image of the cornea and cross-wire.

Instead of a ball of cotton or other object for fixation, as in the older method, a circular mirror is placed at a distance of 12 inches above the injured eye. The patient gazes in the mirror and sees a reflected image of the injured eye and the circular celluloid disc with the steel indicating ball in its center. After the ball has been adjusted to a point opposite the center of the cornea of the injured eye, the patient by fixing the ball with the seeing eye prevents any movement of the eye during the exposures and holds the visual line of the injured eye parallel with the plate.

In order to shorten the time of making the radiographs and lessen the possibility of any movement of the patient or apparatus in changing plates, the two exposures in the new apparatus are made upon one plate, metallic shutters protecting those portions of the plate which are not to be exposed to the rays.

The tube-holder contains the usual cylindrical lead-glass shield for protecting the operator from the action of the rays, with the customary lead diaphragm. The central orifice of the diaphragm is covered with aluminum, which offers little obstruction to the rays, but lessens the risk of any unfavorable action of the rays upon the patient and guards against possible damage to the eyes in the event of breakage of the tube. The tube-holder slides upon a graduated rod, and the first exposure is made with the indicator at zero, in which position the rays pass in a direction corresponding with the horizontal plane of the eyeball. The second exposure is made with the tube at its farthest point to the right or left of the first position, depending upon which eye is to be examined. The illustration (Fig. 1) gives a view of the complete apparatus.

Since the relative position of the tube in reference to the indicating ball and the photographic plate remains fixed and known, it is readily seen that the direction of the X-rays in passing through the eyeball must follow a definite course, which is always the same for the two separate exposures. It is, therefore, possible to indicate on the localization chart the direction of the rays at the two exposures, and this has been done in the chart, a copy of which is reproduced in Fig. 4, re-

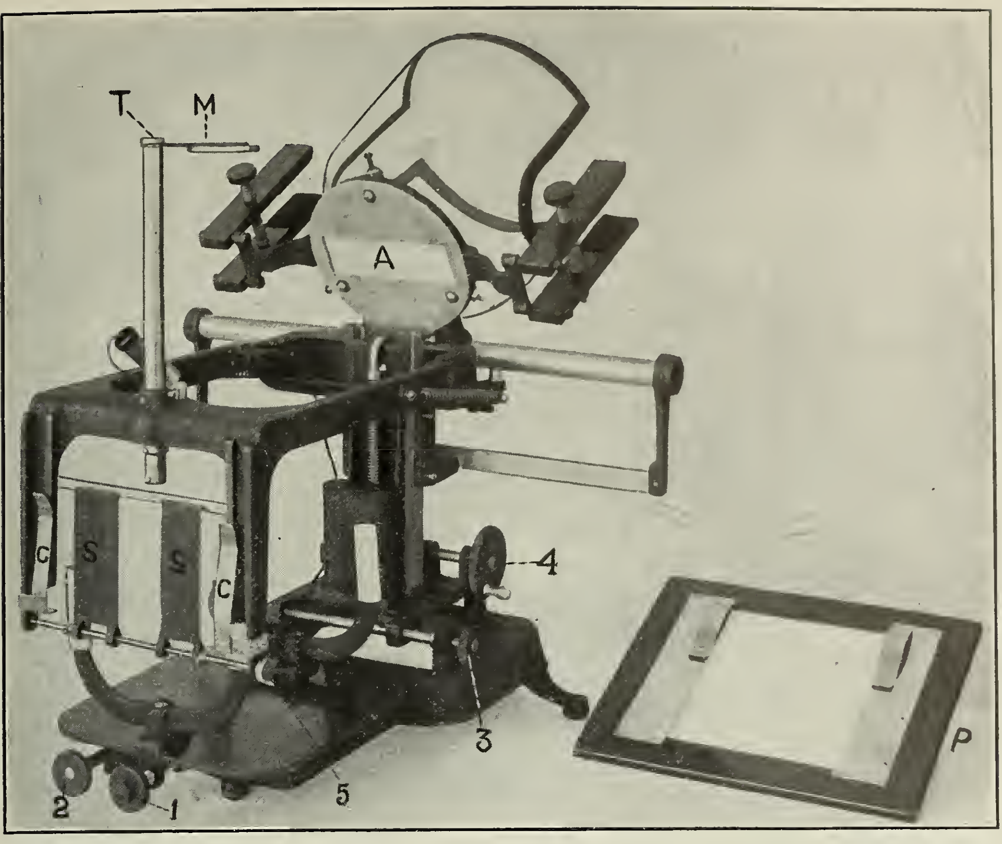


Fig. 1.

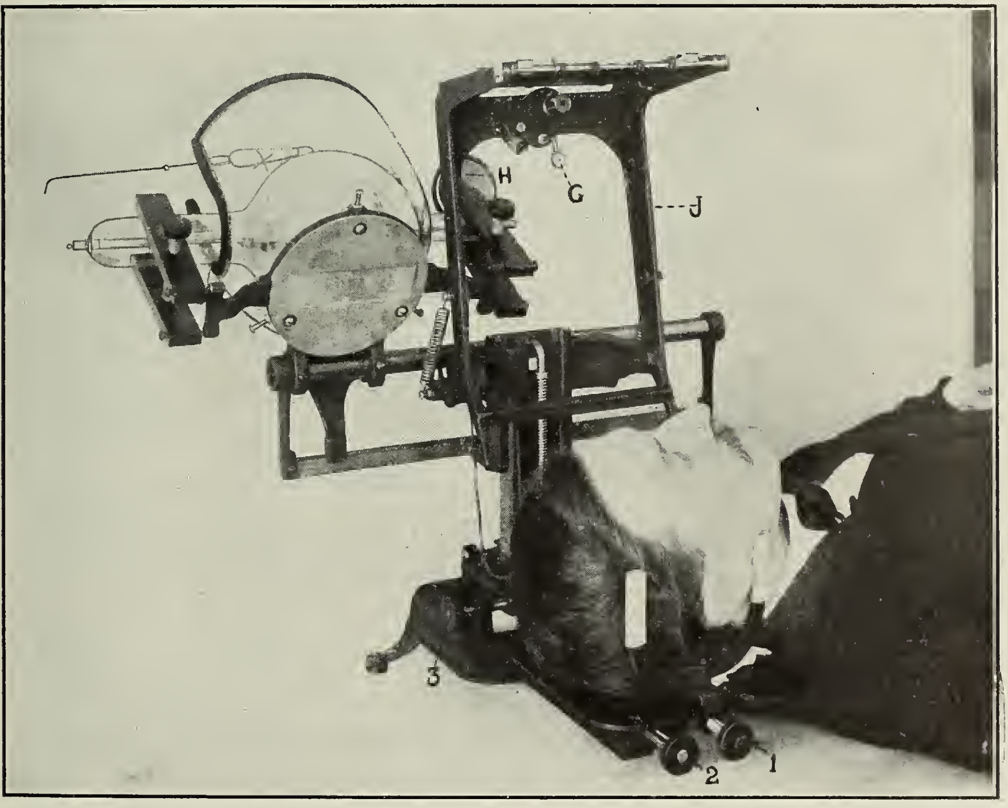


Fig. 2.

duced in size one-half. Only those lines representing rays 2 mm. apart are reproduced, but each line is drawn with the required amount of divergence to indicate the rays as coming from a point the distance of the tube from the photographic plate.

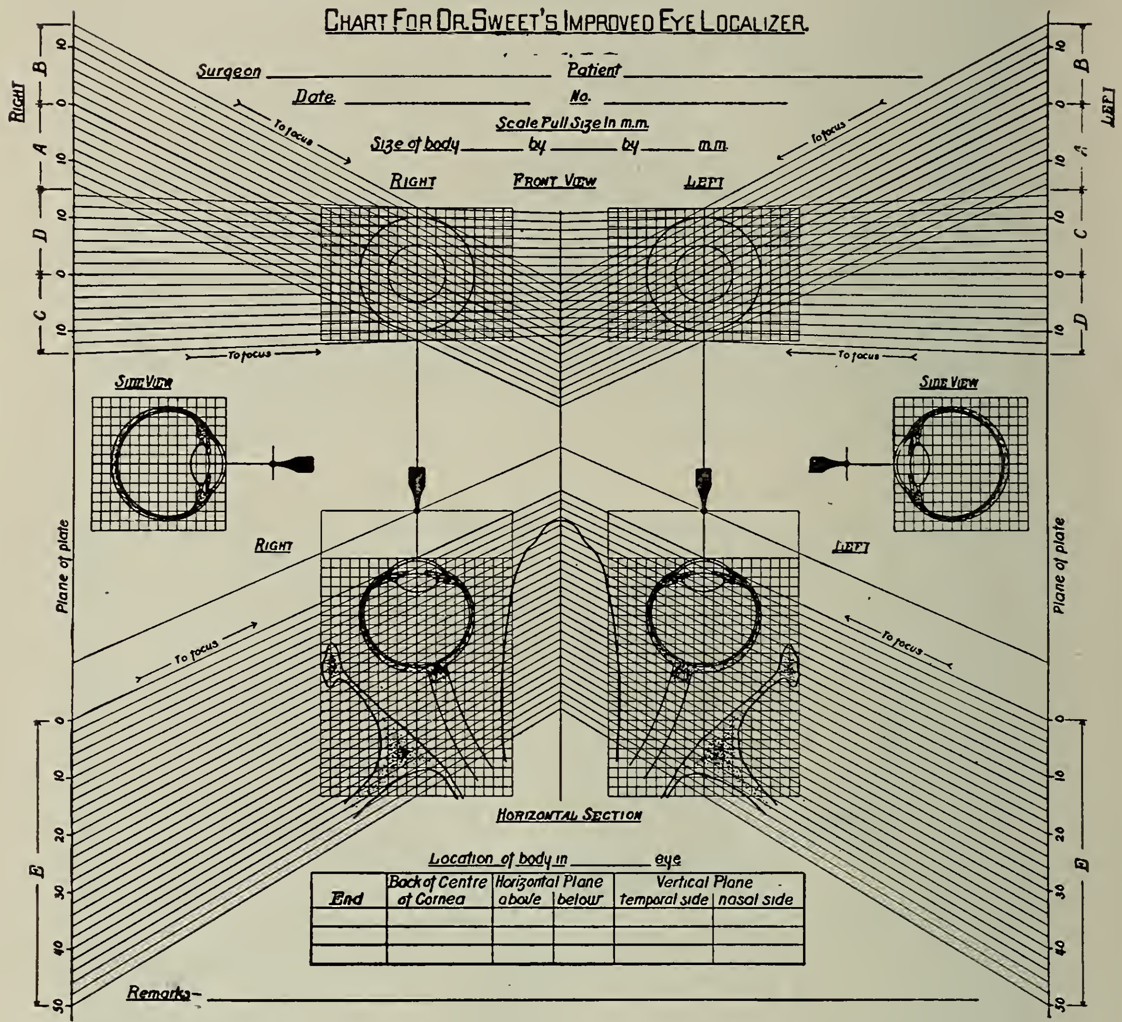


Fig. 4.—Localization chart, with lines representing course of the x-rays (one-half actual size).

METHOD OF EMPLOYING THE NEW LOCALIZER.—The apparatus is arranged as shown in Fig. 2. The patient lies with the head on a platform of hard fiber, with a pillow beneath the shoulders and a small sand-bag under the head and neck. The upright supports for holding the head are now adjusted by

means of the wheel 1, and the jointed part of the apparatus, J, containing the indicator is brought down in position. The indicating ball, G, is now roughly adjusted until it is opposite the center of the cornea and about 12 or 15 mm. distant. The patient looks with the uninjured eye into the mirror, M, and fixes upon the iris or cornea of the injured eye, or, better, upon the indicating ball in the center of the celluloid disc. The indicating ball is now carefully adjusted directly over the corneal center by means of the wheels 2 and 3, and the correctness of the position verified by observation through an opening in the mirror, M. The operator then adjusts the light of the small electric lamp so that the side of the nose next the injured eye is illuminated, but the light is not thrown into the eye. With this area lighted it is possible to see clearly through the telescope, T, when the cross-wire is exactly tangent with the summit of the cornea. The movement necessary to secure this position of the wire is made by means of the adjusting wheel 4. When the image of the cross-wire touches the image of the corneal summit, the indicating ball is exactly 10 mm. from the eyeball.

The photographic plate is inserted beneath the spring clips, C. C., the shutters S S moved so that the center area is open (Fig. 1), and the tube-holder adjusted to the zero point on the sliding scale. The current is turned on, and one exposure made. The tube-carriage is then moved to the limit of the sliding rod, always in the direction of the chin of the recumbent patient (to the end marked R if the radiographs are made of the right eye, and to L if of the left eye). The upper shutter is moved to cover the exposed central portion of the plate and uncover the upper unexposed portion. The current is again turned on and the second exposure made. The time of exposure for the second picture should be about one and a half times that of the first, to allow for the increased distance of the tube from the eye.

After the plate is developed it is placed in the frame P. (Fig. 1), containing the key plate or focal coordinates (Fig. 5), with the film side of the radiograph next to the key plate. The radiograph is moved until the shadow of the indicating ball of

the first exposure is in apposition with the middle ball on the key plate and the heavy horizontal line of the radiograph parallel with the horizontal line on the plate. Holding the frame to

Focal Co-ordinates for Dr. Sweet's

Improved Eye Localizer

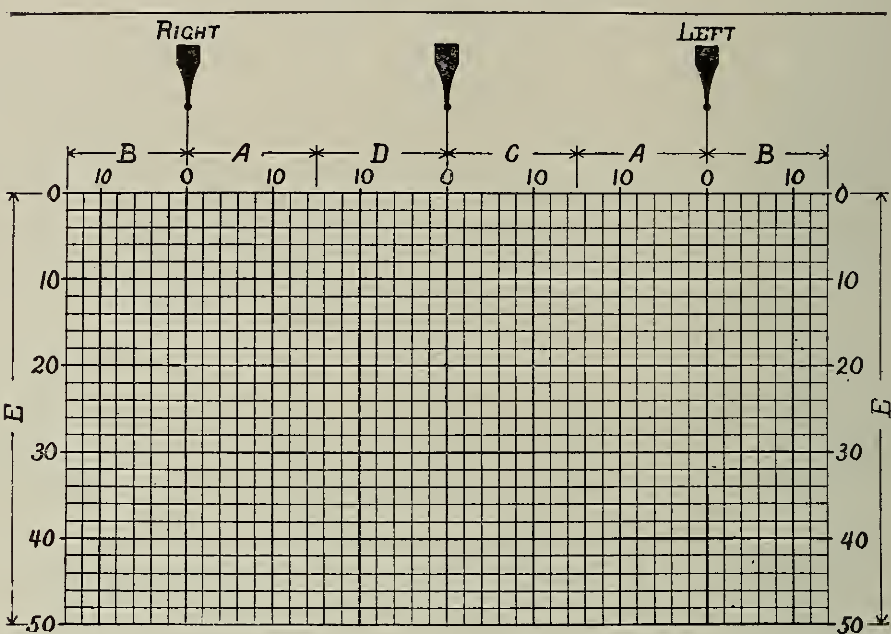


Fig. 5.—Plate showing focal coördinates (three-fourths actual size).

the light, there is noted the position occupied by the shadow of the foreign body with respect to the vertical lines of "C" and "D." A reading is made of the line or lines, which pass through the body, and this is transferred to the corresponding lines of the "C" or "D" scale of the chart, to the right or left side, depending on which eye is under examination: Without removing the plate the "E" reading is similarly made and transferred to the chart. To take the "A" or "B" reading the plate is shifted slightly until the image of the indicating ball on the second exposure coincides with the "Right" or "Left" ball of the vertical coordinates "A" or "B." The line or lines of the "A" or "B" coordinates which cross the shadow of the body are noted and indicated on the "A" or "B" lines of the chart. The

horizontal coordinate "E" should be the same in both readings. If the focus point on the anode of the tube was accurately set by the cross-lines on the lead-glass shield of the tubeholder, the

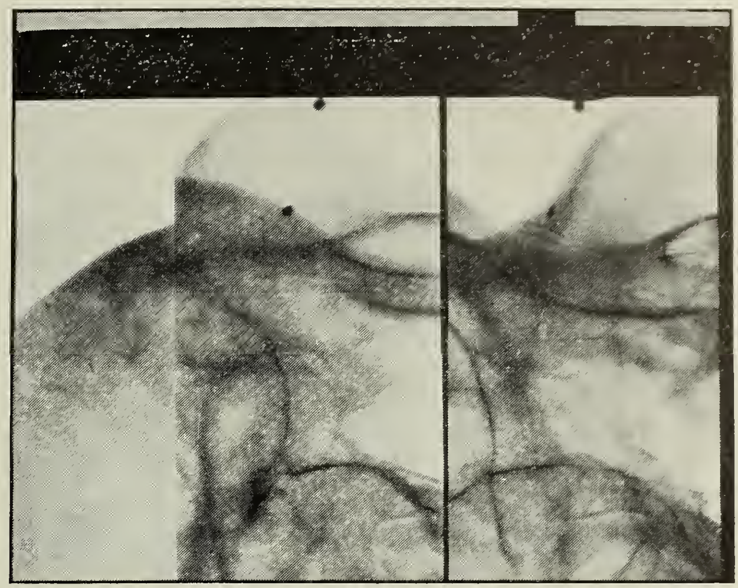


Fig. 6.—Radiograph of foreign body in eye (three-fourths actual size).

images of the indicating ball on the plate will coincide simultaneously with those on the transparent key plate, and it will then not be necessary to reset the plate to read the position of the "A" and "B" coordinates.

After the three readings have been transferred to the chart, the point of crossing of the "A" or "B" and the "C" or "D" lines is found, which gives the location of the foreign body in reference to the front view of the eyeball, indicating its situation above or below the center of the cornea and to the nasal or temporal side of the vertical plane. Where a vertical line from this point crosses the "E" reading on the horizontal section of the globe it gives the depth of the body in the eyeball or orbit. In bodies of large size both ends should be localized to give the position in which the body rests in the globe. The situation of the body on the side view is determined by transferring its measured depth from the horizontal section and its distance above or below the horizontal plane from the front view localization.

The new apparatus is based upon the same general principles as was the old, but its mechanical features eliminate some of the errors that may occur in the use of the present instrument through carelessness of the operator in making the measurements and transferring them to the chart. The inexperienced worker in eye localization is also relieved of the necessity of studying out the position of the tube and the direction of the lines of shadow at the two exposures. The construction of the new apparatus insures that these factors are positively determined and recorded. The accuracy of the localization depends only upon the care with which the operator adjusts the indicating ball opposite the center of the cornea and at the definite and fixed distance from it. After the exposures are made and the plate developed, the determination of the situation of the foreign body is simply a question of reading from a key plate and transcribing these readings to the chart.

Radiographic Search of Foreign Bodies. Etienne Henrard, of Brussels. Annales de Electrolobiologie et de Radiologie, July, 1909.

The author first discusses at length the methods of locating and removing foreign bodies of the respiratory and digestive tracts, and, second, foreign bodies in the other tissues.

The mistakes and difficulties connected with the location and extraction of a needle from the hand must not be attributed to radiography as has been done in recent writings, but rather to a badly made radiograph. The precision with which foreign bodies can now be located should serve to give the surgeon clear and accurate directions to the end that he would no longer pursue a false route in his operation. All foreign bodies should be extracted, because of pain they may cause in the neighborhood or in remote regions, because of injury to nerves, because of loss of power resulting from their presence in muscles, and danger of migration with sometimes fatal results.

The following methods should be abandoned: Taking two radiographs at planes at right angles to each other, because without mathematical calculations one does not arrive at results which give accurate information, extraction of foreign bodies with screen, because of danger from hemorrhage, nerve

injury, infection, and radio-dermatitis, also because radioscopy does not give best results in determining location of foreign body.

What is necessary: Rapid screen examination to determine general location of object, and mark it on the skin with metallic marker, a second rapid screen examination to show that markers are well placed, then make stereoscopic radiographs according to the method of Marie and of Ribout of Toulouse, and finally to employ a geometric process (triangulation) in order to fix the precise spot the surgeon should look for the foreign body. The method is as follows:

Two radiographs are made of the same subject on the same plate at two different angles, the subject remaining in the same position, thus obtaining double shadow of the object. The anticathode is placed at a known distance from the plate, say 415 millimeters, parallel to the plane of the plate, and so that the perpendicular from anticathode to the plate passes through the foreign body. Move the tube 3 centimeters to the left and parallel to the plane of the plate. Make an exposure, then move it the same distance to the right, and make another exposure. There are thus 6 centimeters between the points of emission of the rays in the two exposures. Then after developing our plate we measure the distance between the centers of the two images of the foreign body, and with pencil and paper demonstrate our problem.

Let these two points be known as A and A'. Let C a point below but midway between the above points be the foreign body. Below this draw a dotted line P which represents the plane of the plate. Draw lines from A and A' through the foreign body C to the plane P. Connect the points where these lines intersect P with a straight line aa'. This line represents the distance between the shadows of the foreign body. Thus two triangles are formed with their apex at C, and their bases represented by AA' and aa'. Draw a perpendicular through C from the middle of AA' to the middle of aa'. Let this perpendicular line in the lower triangle be known as x and that in the upper triangle as h. There are then two similar triangles,

the homologous lines of which are proportional, and the following proportion can then be announced: $\frac{x}{h} = \frac{aa'}{AA'}$

But in a proportion the first term is to the sum of the two first as the third is to the sum of the two last, then,

$$\frac{x}{(x+h)} = \frac{aa'}{aa' + AA'} \text{ or } X = \frac{x}{x+h} = \frac{aa'}{aa' + AA'}$$

Replacing these terms by the measures obtained, namely AA'=60 millimeters, aa'=19 millimeters, x+h=445 millimeters, we find that x=107 millimeters. That is, the foreign body is 107 millimeters from the plate. From this other calculations can readily be made.

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN, BAND XIV, HEFT I, AUGUST 30, 1909.

Abstracted by DR. SIDNEY LANGE.

Value of Roentgen Examination of Pulmonary Gangrene, Abscess and Bronchiectasis, by Dr. M. Otten.

The author examined eight cases of gangrene, two cases of abscess, and three cases of bronchiectasis. While the clinical signs of the respective lesion are usually clear, many cases are not definitely recognized without X-ray examination. The chief value of the X-ray in these cases is to make an accurate topographic diagnosis as to the seat of the lesion to guide surgical interference. The X-ray will rarely distinguish abscess from gangrene, but it will differentiate abscess and gangrene on the one hand from bronchiectasis on the other. Abscess and gangrene present hazy infiltration, while bronchiectasis shows dilatations along the bronchial tree.

Contributions to the Roentgen Diagnosis of the Urinary System, by Dr. G. Fedor Haenisch.

I—Pyelography. The difficulty of differentiating renal calculus, tumor and hydronephrosis is so often encountered, that it is desirable in many cases to show the size of the pelvis of the kidney. If the renal pelvis be enlarged beyond the boundaries

of the normal kidney outline, it may be suspected by finding the kidney shadow displaced outward away from the spine and enlarged. But if the pelvis is enlarged "within" the kidney, that is, if the pelvis is enlarged without enlarging the kidney shadow, its recognition by the X-ray becomes impossible.

Voelcker and von Lichtenberg have outlined the pelvis by injecting, through a ureteral catheter, a warm 5 per cent Collargol solution, and then skiagraphing.

Haenisch reports a case in which the symptoms were those of calculus, but upon skiagraphing with the ureteral catheter in situ, the upper end of the catheter (in the renal pelvis) made a wide curve, suggesting a dilated pelvis. Collargol (4 per cent) was then injected, and the skiagraph obtained made the positive diagnosis of hydronephrosis.

II—Sources of Error in the Diagnosis of Calculi.

A case of calcified ovary which resembled a vesical calculus is here reported. The author has held the opinion, that the "pelvis spots" (beckenflecken) so often encountered on the skiagram are phleboliths. During a pelvic operation he found some of these bodies in a venous plexus, and found by microscopic examination that they originated in the lumen of the veins. He discovered similar shadows upon the X-ray plate of an elbow. Since the arm presented many varicose veins, he inferred that the small shadows represented phleboliths.

Another interesting case is reported, in which Blaud's pills gave shadows in the kidney region that resembled calculi.

Gall-Stones Recognized by the X-Ray, by Dr. Edward Gottschalk. Gottschalk reports an unusual case, in which he obtained the shadows of three gall-stones upon the Roentgenogram.

Roentgen Ray Injuries of the Skin, by Dr. Rammstedt.

The author reviews the literature, pathology, and clinical course of X-ray dermatitis. He inclines to the view that idiosyncrasy plays a part in their production.

Thirty-four cases of "Roentgen Carcinoma" (following X-ray dermatitis) are to be found in the literature with a mortality of 24 per cent. Four cases of typical sarcoma have been reported, so that we may also speak of "Roentgen-sarcoma."

Medicinal treatment of X-ray burns has been of no avail. Rammstedt recommends palliative measures until the burn has fully developed. Then it should be excised and the area skin-grafted.

Simultaneous Roentgenography of Both Kidneys by Means of a Double Cathode Tube, by Dr. Franz M. Groedel.

The author shows a device for exposing both kidneys at the same time, by using two parallel cylinders and a "stereo-tube."

Theory of a Method of Giving Heavy Deep X-Ray Treatments Without Injuring the Skin, by Dr. Alban Kohler.

In order to pass heavy X-ray doses deep into the tissues without injuring the skin, it is suggested that a wire screen (or netting) be placed on the skin and a tube having a large focus area be placed but a few centimetres distant. Very heavy exposures may thus be given, which because of the large focus area will (in spite of the wire screen) penetrate the deeper tissues rather uniformly, while the skin, if it is injured at all, will suffer only in the interstices of the wire screen. The burns will thus be punctiform and should heal readily because of the surrounding healthy skin.

Therapeutic Applications of the X-Rays, by Dr. Max Bachem.

A most complete bibliography of the X-ray therapeutic literature of the world, covering 34 pages, is here presented. The lists are classified according to the disease treated, and the end result of the treatment is given in each case.

This compilation should be very valuable for reference.

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN, BAND XIV, HEFT 2, OCTOBER 5, 1909.

Juvenile Epiphyseal Disturbances, by Dr. H. Thiemann.

Under this title four unusual cases are described. The first is that of a boy aged 16 presenting a broadening of the phalangeal joints, with stunted growth of the phalanges of unknown etiology. The roentgenogram showed a spreading out of the margins of epiphyseal cartilages with an irregular thinning at the center. No similar case in the literature.

The second case presents a symmetrical enlargement of both elbow joints which the X-ray shows to be due to diffuse thickening of the bone. Etiology is likewise obscure.

Two cases of multiple exostoses and chondromata which by interfering with the epiphyses resulted in deformed growth are described.

Pathological Calcification and Its Recognition by the X-Ray, by Eug. Fraenkel.

(1) Calcification of the vas deferens is a rather rare occurrence. Routine post-mortems have shown that it does occur however, and not always as a senile change, but may be found as early as 40 years. The change may be unilateral or bilateral. While the cases described were all discovered post-mortem, it is not improbable that extreme calcification of the vas deferens may be recognized during life by the X-ray. Such shadows may be confused with vesical or ureteral calculi.

(2) Under the title of Calcification of the Cerebral Blood-Vessels, the author refers to a rare change in the smaller arteries of the white substance of the brain. The process is not of arterio-sclerotic origin, since the larger vessels are unaffected. The change cannot be recognized during life with the X-rays.

Radiography of Inter-cranial Lesions, by Carl Klieneberger.

In the detection of inter-cranial lesions the X-ray may be used to show changes in the bones of the skull and accumulations of pus in the accessory cavities, or to show changes in the brain itself.

The value of the X-ray in the recognition of disease of the accessory sinuses (mastoids, ethmoids, frontals and antri) and the recognition of gross bone changes such as exostoses, necrosis, new growths as well as atrophy, and erosion from pressure of intercranial tumors and cysts, cannot be questioned. Change in the diploetic canals has been given by Schuller as an indication of an inter-cranial tumor, but the constancy and reliability of this sign is open to question.

The diagnosis of uncalcified cerebral tumors is on very uncertain grounds. The author could find but two well-authenticated cases of non-calcified brain tumors diagnosed by the X-ray in the entire German literature.

More or less calcified tumors offer a better prospect for X-ray detection. A case of calcified tumor of the parietal lobe is reported in full with skiagram.

The Erythema Dose as Measured by the Milliamperemeter, by Prof. Dr. B. Walter.

The author has worked out a series of tables expressing the erythema dose in terms of milliamperemunutes. The erythema tint of the Sabouraud pastilles is used as the basis of the standardization of the tables.

The three important factors to be considered in the measurement of the radiations from the tube are:

(1) The velocity of the cathode rays, i. e., the penetration.

(2) The nature of the metal of the target.

(3) The thickness of the glass wall of tube in the central axis of the rays.

To these must be added another factor, i. e., the target-skin distance.

Tables are presented giving the milliamperemunutes necessary to produce an erythema for variations in the thickness of the wall of the tube (0.2 to 1.0 mm) for variations in the penetration (Walter 2 to 5) and for different distances (10 to 40 cm.). In a special table the various penetration scales (Walter, Benoist and Wehnelt) are compared.

The milliamperemunute tables presuppose the use of a platinum target without a filter, and must be modified according to variations in the metal of the target, and the nature of the filter.

Roentgen Therapy with Short Exposures, by Prof. Dr. Albers-Schönberg.

Schönberg advocates very short therapeutic exposures with a heavy milliamperage. Such short exposures save time and tubes, and are more agreeable to the patient.

In experiments upon guinea pigs, passing 35 milliamperes through the tube with a target-skin-distance of 11½ cm. changes in the testicles were produced in from 36 to 78 seconds.

In the same manner erythema and epilation were produced in patients after an exposure of 15 to 30 seconds (Milliamperage 35, target-skin-distance 13 cm.).

Roentgen Therapy of Deep-lying Tumors, by Dr. H. E. Schmidt.

The author advances a method of treating deep-lying tumors based upon Schwarz's experiments which showed that the capability of reacting to the X-ray depended upon the sensitiveness or susceptibility of the tissue to the ray. This susceptibility varies with the metabolic activity of the tissue. Thus an inflamed or hyperaemic tissue will react more strongly to the ray than will an anaemic or cynosed tissue. He therefore proposes to "desensitize" the skin by pressure-anaemia, and to "sensitize" the deep-lying tumor by using the high-frequency current to produce hyperaemia and increased metabolic activity in that tumor.

Beneficial Influence of the Roentgen Rays upon Menstrual Disturbances, by Dr. Manfred Frankel.

The author summarizes the results of X-ray therapy upon menstruation and menstrual disorders. He has observed 80 cases in which menstruation has been more or less influenced. The early cases were those under treatment for other than pelvic conditions, and in many cases the pelvis received no direct exposure. Nevertheless menstrual changes, such as delayed and scant periods, were noted. This fact speaks for an elective action upon the ovary, or a special susceptibility of the ovary to the X-ray.

Twenty cases of menorrhagia from myomata were favorably influenced with a diminution in the size of the tumor in a large per cent.

Sixty cases of menorrhagia, metrorrhagia, dysmenorrhoea, fluor albus, and endometritis were improved or cured in 5 to 12 treatments.

The first effects are often temporary, and disappear in several months, necessitating a repetition of the treatment. But the ovaries react much quicker to each repetition necessitating fewer treatments.

Time of exposure from 5 to 10 minutes, distance of tube 30 cm., diaphragm 5 cm. in diameter, stanniol filter. Four treatments are given, followed by a 6 days pause. The most favor-

able time for treatment is during the first half of the intermenstrual period and especially after the cessation of the menstrual flow.

The author believes that the uterus is not affected directly but that the changes are brought about through the ovary.

Diverticula of the Oesophagus, by Dr. T. Sjogren.

Two cases of diverticula of the upper part of the oesophagus are reported with skiagrams. S. L.

The American Quarterly of Roentgenology

Edited by P. M. Hickey, M. D.

Vol. II MARCH, 1910 No. 2

X-RAY DIAGNOSIS OF ACHONDROPLASIA AND CRETINISM.

BY HENRY K. PANCOAST, M. D., PHILADELPHIA.

It is probably safe to assert that a fair proportion of the members of our profession would, if put to the test, manifest a certain lack of familiarity with the rather uncommon disease, achondroplasia. This may be attributed in a large measure to the supposed comparative rarity of the condition. It is quite likely, however, that this disease is not so uncommon as it is generally regarded, and that in many instances it is mistaken for some other condition, especially cretinism or rickets, and largely through this very lack of familiarity perhaps.

An unusual opportunity to study this disease afforded by the examination of three typical cases has led to the personal belief that the diagnosis of achondroplasia is best determined by means of the radiograph. If this be true, it is obvious that every Roentgenologist should be sufficiently familiar with the essential clinical and pathological features of the disease

as to be able to recognize the characteristic radiographic appearances presented. For such a purpose there is surely no other disease concerning which a knowledge of fewer facts is necessary. This statement is based upon the fact that a knowledge of the condition no more extensive than the memory of a simple but comprehensive definition of achondroplasia was sufficient to enable me to identify the radiographic appearances presented by the first case either examined or seen.

This case was referred in March, 1909, by Dr. M. H. Fussell, with a provisional diagnosis of cretinism, likewise a condition in connection with which no previous personal experience could be claimed, from the radiographic standpoint at least. Under the circumstances, therefore, a correct clinical diagnosis could hardly be expected of the radiographer in this instance. Therefore the ease with which a radiographic diagnosis of achondroplasia could be made definitely and unhesitatingly after a careful study of the plates was rendered very apparent at once.

Not only can achondroplasia be diagnosed more readily and with more certainty by the radiograph than by clinical methods, but the radiograph in addition presents certain other characteristic features, otherwise undeterminable during life, besides those appearances which represent the generally recognized typical clinical and pathological features.

The radiographic diagnosis is concerned solely with the examination of the bones of the extremities, and depends upon the unusual appearances presented by characteristic abnormalities in their growth and development. Although practically all of the bones of the extremities show some perceptible alterations, the most characteristic features are presented by those which grow or develop to a large extent from their epiphyseal ends. The diagnosis is therefore easiest during childhood, when ossification in the epiphyses of the humerus, femur, and tibia is normally well advanced. During adult life it is somewhat more difficult for the reason that only the results of abnormal development are to be observed. The

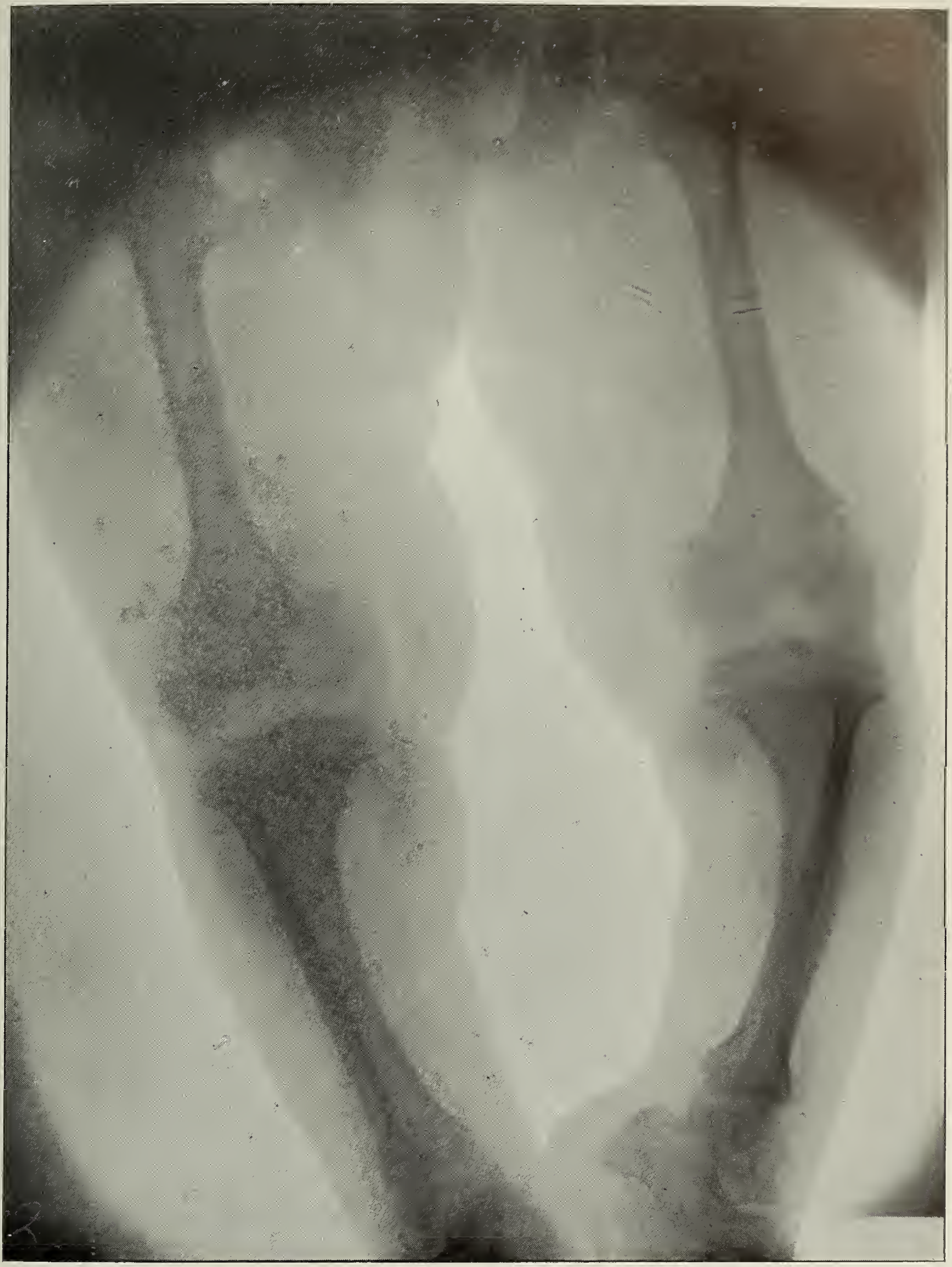


Fig. 1—Lower extremities of a case of Achondroplasia. Male, aged fifteen and one-half years.

greatest difficulty is to be encountered during infancy, before ossification in the epiphyseal extremities of these bones is far advanced normally. At any age, however, characteristic appearances will be presented by some bones of the extremities.

The conditions with which achondroplasia are likely to be confused, radiographically as well as clinically, are cretinism and rickets, and the essential points of difference between the skiagraphic appearances of each of the three diseases will be indicated as each of the characteristic radiographic features of achondroplasia is discussed.

Cretinism presents fewer characteristic radiographic features than achondroplasia, and the X-ray diagnosis of the former condition by itself is, therefore, more difficult, but a distinction between the two can be very readily made. Unfortunately the statements that follow concerning cretinism had to be based upon the examination of a single typical case.

Such radiographic features of achondroplasia as are characteristic of the disease and essential in its diagnosis may be conveniently classified under four groups, as follows:

A. Abnormalities in Epiphyseal Growth and Development.

1. A moderate but apparent delay in the beginning of the process of epiphyseal ossification. This is general and is readily determined by comparisons with radiographs of normal individuals of the same age.

This is also a feature of cretinism, and will not therefore serve the purpose of distinguishing between the two conditions.

It is not a noticeable feature of rickets, and if there is any apparent delay, it is not so general as in the other two conditions, and is not manifest very long after the subsidence of the active period of the disease.

2. A moderate retardation in the progress of epiphyseal ossification, which tends later to a slight actual deficiency in development rather than to delayed union.

A similar delay is observed in the cretin, and the deficiency in development is perhaps somewhat more marked. In addition, some delay in epiphyseal union is apparent.

In rickets any retardation would not be nearly as marked unless during the active period, and even then it would not be so general.

3. Deficient and irregular ossification of the epiphyseal ends of the diaphyses is very pronounced, being decidedly apparent during infancy and early childhood, and is especially noticeable in those localities where the growth in length of the shafts takes place largely from the diaphyso-epiphyseal junctions, as at the knee particularly.

This is not a feature of cretinism, but in rickets an appearance somewhat similar is presented. The line of ossification is straighter, however, and has a more ragged and rarefied appearance, due to absorption of bony trabeculae and a coincident failure at calcification, and not to deficient development.

4. Although actually somewhat deficient in development, the epiphyses in children and the fully ossified ends in adults are relatively far better developed than the diaphyses or shafts. This is one of the most characteristic radiographic features of achondroplasia.

In the cretin the appearance is practically the reverse, the epiphyses appearing relatively less well developed if anything than the shafts. This is one of the most important points of distinction between the two diseases radiographically.

In rickets the epiphyseal ends may appear relatively more developed than the shafts clinically, but their actual development as indicated radiographically by the extent of ossification is not materially greater, and certainly never to the extent which is characteristic of achondroplasia.

5. In all of the long and the short long bones of the extremities a relatively greater degree of development of the diaphyses seems apparent in the immediate neighborhood of the epiphyseal lines, and this is manifest in all of them to a greater or less extent in an abrupt expansion at the epiphyseal

Fig. 2—Lower extremities of a case of Cretinism. Female, aged ten years.

ends of the diaphyses, and to a width corresponding to that of the ossified epiphyses.

In cretinism, although the ends of the diaphyses are very much wider than at the middle, there is not the abrupt expansion so characteristic of achondroplasia, but it is gradual as in the normal individual.

The same may be said of rickets.

6. In the case of the metacarpals and metatarsals this peculiar feature gives rise to a very characteristic radiographic appearance in the hands and feet, and one which is not seen in either cretinism or rickets.

7. The same tendency is manifest in the immediate neighborhood of ossification centers of which the growth in general of the shaft is entirely independent, and entirely or nearly so locally, as at the olecranon and lesser trochanter. In the latter instance it is manifest even before epiphyseal ossification begins, and the radiographic appearance presented is characteristic of the condition, and also sufficiently striking to render it an important distinguishing feature between this disease and either cretinism or rickets.

8. The bones of the carpus and tarsus and the patella, while presenting no distinctly characteristic features, exhibit a corresponding delay in ossification or resulting degree of deficiency in development. This is not a distinguishing feature for the reason that a similar, and, if anything, even greater delay and deficiency is manifest in cretinism. In rickets, however, ossification and development of these bones are not similarly affected.

B. Abnormalities in Growth and Development of the Shafts.

1. The shafts of all the long and short long bones of the extremities are not only actually very much shorter than in the normal individual of the same age, but are also relatively short for the size of the achondroplastic's body, and as compared with the other long bones such as the clavicle and ribs.

This can be identified as a deficiency in growth and development from the epiphyseal ends, and is most marked and most apparent in those bones which are the most dependent for their growth in length upon such centers, as the humerus, radius, tibia, and femur especially. These bones may not be found much more than half the length of those of the normal individual of the same age. This is another of the distinctive radiographic features of achondroplasia.

In the cretin, while the shafts are shorter than normal, they are not relatively short for the size of the body or the length of the other long bones, or at least the contrast is by no means so marked as in achondroplasia. Moreover, the shafts do not appear relatively less developed than the epiphyseal extremities or the ends of the bones.

In rickets the shafts of the long bones may be actually shorter than normal, and especially after the active period of the disease has been passed, but as in the cretin they are not relatively short for the body when the apparent shortening due to the usual deformities or bowing is duly considered. Moreover, the shafts do not present the decided lack of development as compared with the ends that is so characteristic of achondroplasia.

2. All of the long and short long bones of the extremities, although actually thinner than normal, are relatively thick for the lengths of their shafts. This is radiographic evidence that periosteal growth is not affected to nearly the same extent in this disease as is epiphyseal development of the shafts.

In the cretin the thickness is nearly or quite in the proper proportion to the length of the shafts. The middle of the shafts, particularly of the tibia and femur, is apt to be found considerably thinner than normal, but toward their ends the diameter gradually increases to a width much nearer the normal. This might be accepted as radiographic evidence that deficiency in development from epiphyseal ends is not an essential pathologic feature in cretinism as in achondroplasia.

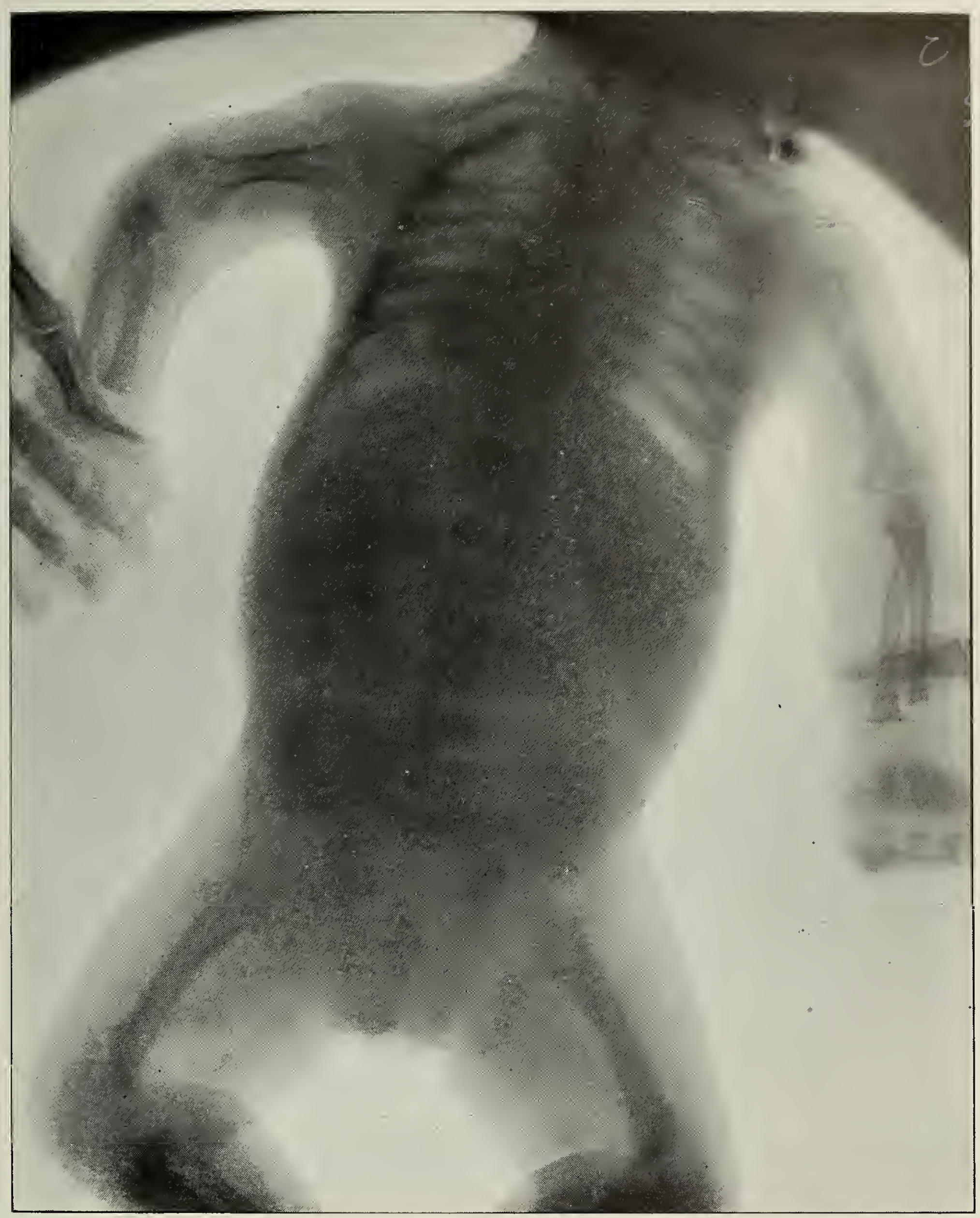


FIG. 3—Achondroplastic male, aged fourteen months.

In rickets the thickness of the shafts is not to any great extent out of proper proportion to their actual lengths, particularly in the case of the bones of the hands and feet.

3. Many of the long bones appear decidedly bowed. These deformities tend materially to exaggerate the stunted appearance of the extremities for which the shortness of the bones is primarily responsible. At least two factors in the production of the bowing are demonstrable by the radiograph. It is perhaps most marked in the tibia and femur near their adjacent ends, or immediately in the neighborhood of their respective diaphyso-epiphyseal junctions. In these localities the deformities appear to be largely the result of irregularity as well as deficiency in development and ossification. A second but less important or characteristic factor is usually best demonstrable in connection with the bowing of the ulna, which is apparently due to the relatively better development and greater length of this bone than its fellow, the radius, which is more dependent for its growth upon the activity of the region of the lower epiphysis.

In cretinism, in which disturbances in the epiphyseal development of the shafts is not an essential pathologic feature, bowing is not a characteristic appearance.

Rickets presents very similar deformities, but in the case of the tibia and femur the bowing, which is here the result of alterations in the ultimate constituency of the bones and is not developmental, is not so abrupt and distinctly localized to the very limited area as in achondroplasia, but is a more gradual bend involving a greater extent of the shaft. Moreover, the bones of the hands and feet are not so generally or markedly deformed, if at all, as are those of the achondroplastic.

C. Abnormalities in Osseous Structure:

1. A very characteristic appearance of the cancellous structure of the ends or epiphyseal centres of the long bones of the extremities, and of the small bones of the carpus and tarsus, is readily observed in clear radiographs. This peculiar appear-

ance arises from deficiencies or abnormalities in the development of the osseous structure, and is characterized by relatively few walls, and abnormally large spaces correspondingly reduced in number. It is to be observed to best advantage perhaps in the os calcis. The walls as a rule appear to be better developed or are more noticeable in one general direction. The appearance is quite different from that so frequently observed in connection with chronic forms of arthritis and in many other conditions, in which it represents a process of rarefaction or thinning of the walls by absorption with resulting increase in size of the cancellous spaces, but without reduction in their number.

This is distinctly a feature of achondroplasia, and is not characteristic of either cretinism or rickets, and should not be confused with the appearance due to rarefaction in the latter disease.

2. A noticeable but hardly a characteristic feature is the appearance frequently presented by the relatively increased diameter of the medullary canals and their correspondingly thin compact walls in the short thick shafts of the long bones.

D. Other Characteristic but Distinctly Radiographic Features:

1. The radiograph reveals a characteristic tendency for the growth of **exostoses** from the bones of the arm, and particularly from the humerus, with a very striking symmetry in their location on the two sides. Such growths are noticeably absent, however, in the lower extremities. This is distinctly a feature of achondroplasia.

2. Several characteristic features are presented as a result of abnormalities in development of the upper portion of the femur. The neck of the bone is noticeably thin and short and lacking in development at all ages, while the head shows a degree of ossification and development which about corresponds with the epiphyseal extremities or ends of the bones elsewhere. Far more striking in comparison with the unde-

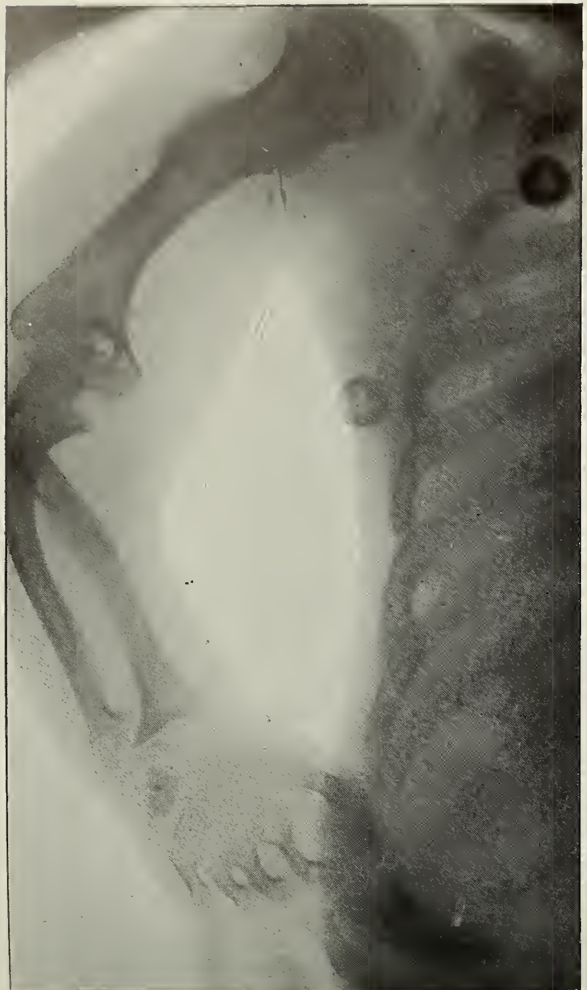


Fig. 4—Right upper extremity of same case as Fig. 1.

Fig. 5—Left upper extremity of same case as Fig. 1.

veloped neck is the relatively superior development of the trochanters, especially the lesser.

In conclusion, the most strikingly characteristic radiographic features of achondroplasia may be summarized about in their order of importance as follows:

1. A very decided deficiency in epiphyseal development of the shafts or diaphyses of the long bones of the extremities, making them appear not only very short actually but also relatively in comparison with the size of the body and the lengths of other long bones as the ribs and clavicle. They also appear too thick for their lengths. This deficiency, together with the relatively far better, though not normal, development of the epiphyseal extremities or ends, constitute the most characteristic radiographic feature of the disease.

2. The peculiar characteristic appearance of the hands and feet due to the same abnormalities in development of the short long bones.

3. The abrupt expansion of the diaphyses or shafts in the immediate neighborhood of the diaphyso-epiphyseal junctions.

4. The rather abrupt bowing of the lower end of the femur and upper end of the tibia in these same localities.

5. The characteristic appearance of the upper portion of the femur,—the fairly well developed head, poorly developed, short thin neck, and the far better relative development of the trochanters, the latter being manifest in the adjacent portions of the shaft even before ossification in the epiphyses has begun, especially in the lesser trochanter.

6. The tendency to symmetrical osteomatous growths from the long bones of the upper extremities.

7. The characteristic appearance of the structure of cancellous bone.

8. Deficient and irregular ossification and growth at the epiphyseal ends of the diaphyses, observable during infancy and early childhood, particularly at the knee.

Cretinism presents no distinctly characteristic radiographic features of its own, but it is not likely to be mistaken clinic-

ally for any other conditions than achondroplasia and rickets, from either of which it may be readily distinguished radiographically.

4238 Pine Street.

DISCUSSION.

DR. CHARLES LESTER LEONARD, PHILADELPHIA, PA.

Dr. Pancoast spoke of the difference between cretinism and achondroplasia, but stated that he found no distinctive features in the bones of the cretin. About eight or nine years ago I had an opportunity to study cretinism, before ossification of the epiphyses had taken place. I found in the epiphyses of the head of the tibia and in the lower end of the femur, as well as in the bones of the ankle and foot, separate spots of ossification. There was more density there than in the rest of the bone. I found three rings of ossification in all the small bones of the foot, concentric around the centers of ossification.

It seems to me that this is an important point, one by which we can differentiate early cretinism from the ordinary forms of diseased bones, such as Dr. Pancoast has spoken of. I would like to ask him whether he has seen these concentric rings in the epiphyses, and in the small bones of the foot in the case he studied.

DR. P. M. HICKEY, DETROIT, MICHIGAN.

A point in the radiography of cretins is that often the bone development corresponds very closely with the mental development. A cretin with the mental development of the average child of five usually has bones which, in development, are like those of a child of five, showing, I think, that there must be some relationship between mental and bone development.

DR. JOHN W. HUNTER, JR., NORFOLK, VIRGINIA.

I would like to ask Dr. Pancoast whether he has ever noticed any difference in the radiographs made before and after the administration of thyroidectin in these cases.

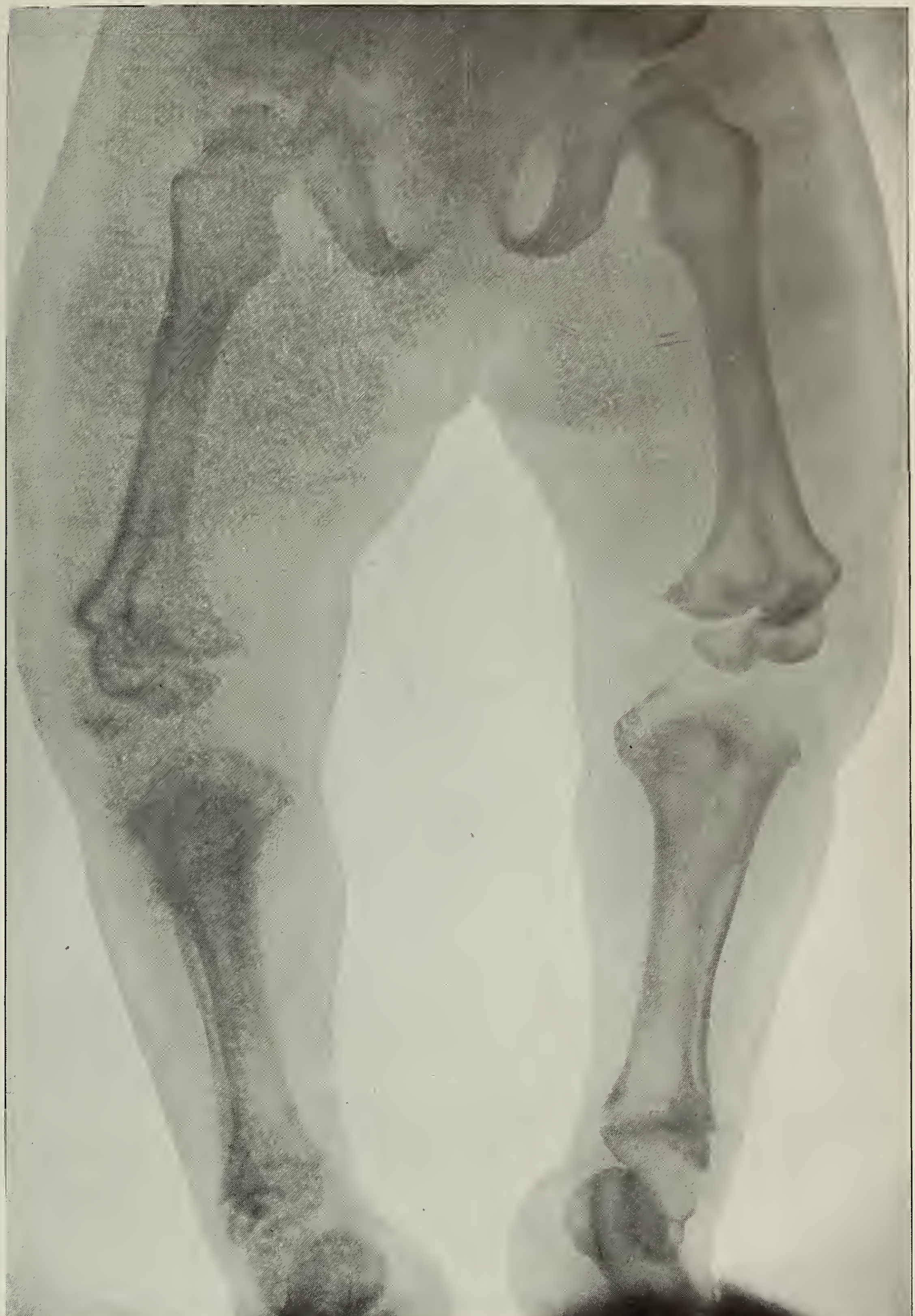


Fig. 6—A more recent case of Achondroplasia—a boy aged six years—showing the characteristic radiographic appearance of the hips.

DR. LEWIS GREGORY COLE, NEW YORK.

I have had several cases of cretinism and of osteomalacia, and the greatest difficulty I have had has been in getting the practitioners to agree on the diagnosis. One man will say it is a case of cretinism, another will call it a form of osteomalacia, and a third will claim that it is some other obscure bone lesion, so that I have had some trouble in checking up the findings. I would like to ask Dr. Pancoast whether the physicians who saw these cases in consultation with him agreed with him and with each other in the diagnosis. Also, I would like to know if he had a sufficient number of these cases in which the diagnosis was positive, and how many of these cases he has had.

DR. PANCOAST (closing the discussion).

Replying to the question of Dr. Leonard, with reference to the rings of ossification, I have not observed this. The only cretin I examined was ten years old, and I did not make much of an examination of any part of the body except the long bones, so as to get the general appearance of the hands and feet, because these were the things which, to my mind, were essential to the differential diagnosis.

I said that cretinism did not show any distinctly characteristic X-ray pictures, but I did not mean to say that the diagnosis could not be made with the X-ray; merely that it was difficult to do so as compared with achondroplasia, where the diagnosis can be made with ease.

As to Dr. Hickey's point, concerning the relationship between the mental development and the bone development, I cannot say that that was true in the patient I examined. The patient was ten years old and there had been no change in the mental development for years. I think that there is to be found a decidedly apparent delay in the ossification of the epiphyses. It was the only case of cretinism that I studied, and I had no opportunity to note the condition before and after treatment.

In every one of these cases the physicians were ready to accept the radiographic evidence and findings, and I think that they agreed in all details with the pathologic and clinical features. Of course, there were a few additional radiographic features which can be shown only in this way during life; for instance, the appearance of the hips, the exostoses, and the development of the trochanters.

THE TREATMENT OF ORDINARY AND EXOPHTHALMIC GOITRE WITH SPECIAL REFERENCE TO THE ROENTGEN METHOD.*

BY CARL BECK, M. D.,
Professor of Surgery in the New York Postgraduate Medical School and Hospital, Visiting Surgeon to the St. Mark's Hospital, and the German Poliklinik.

1. A strict line of distinction has to be drawn between common goitre (struma) and exophthalmic goitre (Basedow's, or Graves' Disease), common goitre representing a simple enlargement, while the exophthalmic type is characterized by the production of a special toxine by the thyroid gland.

2. Common goitre, in other words, means either diffuse or partial hypertrophy of the glandular tissue. The contents of the follicles increase and the blood vessels become dilated and multiply. An increase of connective tissue is but rarely observed. The structures may be adenoid, colloid, vascular and adenomatous, the latter form to be subdivided into parenchymatous, fibrous, fibrocalcareous, osteofibrous and vascular varieties. The nature of the tissue change explains why the Roentgen method will only exceptionally be successful. It should, therefore, in order to avoid discrediting the Roentgen treatment, only exceptionally be tried in ordinary goitre.

The disturbances caused by ordinary goitre are of a mechanical character, pressure by a large goitre, for instance, producing lateral curvature of the trachea, followed by symptoms of suffocation. Then speedy strumectomy is imperatively necessary. In small goitres cosmetic considerations may indicate removal, although the condition of the patient be normal otherwise. In cystic goitre I have with rare exceptions succeeded by aspirating the cystic fluid (generally consisting of bloody serum) and injecting one-half ounce of a 10% emulsion of iodoform-glycerine in adults. The area of aspiration must

*Read by title at the meeting of the American Roentgen Ray Society, September 23d, 1909.

Fig. 7—Unilocular cystic goitre containing bloody serum.

be carefully selected in order to avoid the large superficial veins. As a rule the median line may be selected after a drop of Tr. Iodi. is applied at the point of entrance, Fig. 7. Sometimes the cystic goitre disappears after one injection, as in the one illustrated by Fig. 7, but as a rule it has to be repeated three or four times and, on an average, at weekly intervals. In multilocular cystic goitre (Fig. 8), the needle is best inserted at the center of the individual cyst. Sometimes they appear so hard on touch, that they leave the impression of being fibrous.

The fibrous, and especially the calcareous and osteofibrous varieties, can be demonstrated by a Roentgen plate. I had the privilege of first showing skiagraphs of the calcareous deposits in "Beitrag zur Diagnostik und Therapie der Struma, Fortschritte auf dem Gebiete der Roentgenstrahlen," Vol. IV (1900). The parenchymatous injections of a saturated solution of iodoform-ether have a marked influence sometimes in the softer fibrous type, but the shrinking process is extremely slow. Thyroid extract has an effect sometimes. The most radical measure, of course, is the removal by the knife. By combining the enucleation method with that of limited division, my mortality rate during the last five years was practically nil. (My method is described in the recent translation by Schröder, of my text-book on Surgical Diseases of the Chest, page 320, Hirschwald, Berlin.)

3. In great contrast to so-called ordinary goitre the exophthalmic form means a general infection produced by a faulty chemical activity of the thyroid gland. This being taken for granted, the natural therapy of the disease is characterized by directly attacking the thyroid gland. This is effectively done by thyroidectomy, as Kocher's admirable statistics prove. But even the great master in this field admits a mortality rate of 5% ; others speak of even 30%. My previous mortality of bilateral thyroidectomy amounted to 12%, although I exercised great care, laying special stress upon hemostasis, always operating under local anesthesia (generally not even employing cocaine but resorting to Schleich's infiltration). I have, therefore, made it a rule to compromise, so to say, and to exsect the largest lobe only, thus lessening the gravity of the interference. As a rule the patient is benefited by the partial removal, as soon as the immediate effects of the operation are over. Then it remains to treat the smaller lobe which was left alone. The observation that the Roentgen method has an inflammatory influence on the walls of the blood vessels by shrinking (a specific kind of chronic endarteritis), which can be utilized in succulent tumors with therapeutic effect, induced me to try the rays in such cases of Morbus Basedowi, which

showed small enlargements of the thyroid gland with the most gratifying results. Encouraged by this, I began to apply the Roentgen method as a secondary means of therapy to the remaining lobe. Later I found that all cases of Basedow's Disease were benefited by the Roentgen method.

Fig. 8—Multilocular cystic goitre.

4. My statistics during the last five years show the following record:

Large Basedow goitre—14 cases; 13 cured by the combination treatment (also see Ueber die Kombination von Excisions- und Roentgen-Therapie bei Morbus Basedowi. Berliner klinische Wochenschrift, 1905, No. 20); one considerably improved, and one still under treatment (all women).

Thirty-eight cases, small sized goitres, most of them showing severe symptoms, especially tachycardia; 32 cases are cured, 2 improved, 1 unsuccessful, and 1 showing an increase in size and greater intensity of symptoms. This latter case seems to me to be unduly influenced by some arbitrary pseudotherapy on the part of the desperate patient. (Compare my report "Partial Thyroidectomy combined with Roentgen treatment in Basedow's disease, Post-graduate Twenty-fifth Anniversary Volume 1908.)

5. My modus operandi is: Irradiation through diaphragm in the sitting posture, usual current, for five minutes. (Fig. 9). If patient shows much uneasiness on account of the tachycardia, I allow frequent intervals. Séances every two days until there is a very slight reaction (decolorization), or if there are oppressing symptoms. Then I stop for about a week to start again until there is a considerable improvement, which will induce me to continue the treatment for 2 or 3 months, at weekly intervals. During the treatment I administer the Roncegno iron-arsenic Mineral Water in doses of a tablespoonful three times a day.

In advanced cases of Morbus Basedowi, where alarming symptoms forbid immediate operative interference, Roentgen treatment should precede the operation until improvement.

It is difficult to explain the physiological influence of the Roentgen Rays upon the Basedow goitre. The observation that the most tormenting symptoms, especially the tachycardia, often become less before the goitre diminishes visibly, indicates that first of all the toxine production in the thyroid gland is suppressed, or at least minimized. How far the sympathetic nerve system is involved at the same time cannot be answered satisfactorily at present. A large number of eminent investigators have devoted much time to these questions and some interesting facts were revealed, but nothing definite as to the etiological factors has been brought forth so far. The fundamental question will resolve itself in a metabolic problem, as many signs indicate. The cachexia strumipriva,

the Cretinism and other general symptoms of degeneration after total thyroidectomy in some individuals demonstrate that the thyroid gland has an important function, the destruction of which is apt to take its revenge. What is this function and how is it altered in Basedow's disease? On the whole it must be of a "disvirulizing" nature. Its disturbance by disthy-

FIG. 9—Lateral exposure through diaphragm of author, in a case of moderate Basedow's disease; after the twelfth exposure, as a rule the front is exposed three minutes and each side for one minute.

roidosis, over- and under-thyroidosis must therefore determine the different types of reaction.

It is most interesting also to observe the mutual relations to other organs and their various affections, and their influence on the economy of the body, as for instance in the thymus.

(See German translation of my text-book on Thoracic Surgery, page 307 and 309.) The relations to tuberculosis I have touched by presenting a tuberculous patient showing exophthalmus as well as enlargement of the thyroid, tachycardia and tremor, to the New York German Medical Society, June, 1908. (See also "How is exophthalmus, tachycardia and tremor following extirpation of the tuberculous glands of the neck to be explained?" Archives of diagnosis, October, 1908.) The elements which constitute the enlargement of thyroid tissue take an antagonistic action against tuberculous tendencies. The following observation is instructive in this respect: A girl of 25 years showed symptoms of pulmonary tuberculosis five years ago. She moved into a region in which goitre was endemic. After staying a year there she noticed an enlargement of the thyroid gland, which increased slowly. The same time the symptoms of tuberculosis became gradually less. Two years ago the patient emigrated to New York City, where I examined her about the same time at the St. Mark's Hospital. She appeared to be perfectly normal with the exception of showing a cystic goitre of the size of a man's fist. After discharging the bloody serous fluid by aspiration, I injected one-half ounce of an emulsion of iodoform-glycerin, which was followed by considerable reaction. Slight fever acerbations at evening, nightly perspiration, weakness, cough, and later the evidence of physical signs demonstrated the recurrence of tuberculous infection, which was corroborated by the microscopical examination of the sputa. The goitre treatment was given up and an antituberculous therapy substituted. At present the patient is much better and the goitre, previously reduced to one-third of its size, has become nearly as large as before. Similar observations I have repeatedly made in a region where goitre is endemic. In corroboration of the theory I may report the following family history, which embraces five generations:

(1) Man of strong appearance, when 26 years, died two years later from pulmonary tuberculosis.

(2) Son, also strong, married when 22 years old; died five years later from pulmonary consumption.

(3) Son of the former, also strong, married when 26 years old, died 14 years later from pulmonary consumption. When 36 years old he moved into a village where goitre is endemic and married his third wife, who was afflicted with a goitre of medium size.

(4) Son of the former, married when 28 years old, died when 64, the maternal mixture probably having controverted the tendency. Had 14 children, of whom 3 died as infants from intestinal and meningeal symptoms. The others are still alive, some of them being over 50.

Based on these observations, would it not be worth while trying to send tuberculous patients to mountainous resorts where goitre is endemic to let them partake of the mysterious imponderabilium which constitutes the thyrogenous element? And is it a question of bacteria or of soil or both?

X-RAY WORK IN HOSPITALS.

BY ROLLIN H. STEVENS, M. D., DETROIT, MICHIGAN.

After a few years of brilliant research by roentgenologists, the value of the roentgen ray as a necessary aid in diagnosis is being rapidly established on a firm basis. Its use as a therapeutic agent of superior value is perhaps not so well recognized by the profession as a whole, and yet its unequalled success in the treatment of certain malignant growths and diseases of the skin cannot be gainsaid.

Few hospitals in this country are now without some sort of roentgen equipment. Few hospitals, however, appear to have a fair appreciation of the importance of a first-class roentgen laboratory as a part of their equipment.

About a year ago the writer began an inquiry as to conditions in some of the principal hospitals in this country. Letters with question blanks were sent to members of this society, it being presumed that most of them were doing X-ray work in hospitals. Prompt and courteous replies were invariably received, but it was soon ascertained that many of our best known men did not find hospital work attractive.

The author desires to hereby express his sincere thanks and appreciation for the replies received.

COST OF EQUIPMENT.

The number of hospitals reporting the cost of equipment, which, it was stated in some cases, did not include old discarded apparatus, was fifty-eight. The total cost of equipment was $68,350.00 in fifty-eight hospitals. One of these, however, had spent $5,500.00 in equipment which was about twice that of the highest amount paid by any other hospital. Therefore, it was deemed fairer to leave out this hospital in striking an average. This would leave a total for fifty-seven hospitals of $62,850.00, or an average per hospital of $1,102.65.

OWNERSHIP OF EQUIPMENT.

Thirty-nine out of fifty-eight hospitals (or associated colleges), representing 67.2%, own their own equipment. In sixteen out of the fifty-eight hospitals representing 27.5%, the roentgenographers provide the equipment. In two hospitals the visiting staffs provide it, and in one case it is provided by a post-graduate college.

Sixteen roentgenologists, who represent 28% of the fifty-seven hospitals, own equipment valued at $28,000.00, which is 33% of the total cost of equipment. The average cost of apparatus furnished by the roentgenologists is $1,500.00, as against $1,025.60, the average cost of apparatus furnished by hospitals, colleges, etc.

HOW THE ROENTGENOLOGIST IS PAID.

Seven of the fifty-eight hospitals, or 12%, pay their roentgenologists salaries, and provide their own equipments. The salaries range from small and unstated amounts to $1,000.00 per year. In these cases the hospitals collect small fees from patients who are able to pay.

Fifteen, or 25.8%, of the hospitals divide all the fees with the roentgenologist, who receives no salary. The percentage the roentgenologist receives is 50% to 80%. In one of these cases the roentgenologist provides his own apparatus and plates. In one case the roentgenologist receives a stated salary and 10% of the fees. The amount of the salary was not mentioned. In five hospitals the roentgenologist receives no remuneration whatever, all except one having only free patients. In this exception the hospital is even inconsiderate enough to take all the fees from pay patients.

None of the sixteen roentgenologists owning the apparatus in the hospitals receive a salary, but depend upon the fees they receive from pay patients for their remuneration. Only one of the sixteen divides his fees with the hospital. He keeps 50%.

NUMBER OF FREE ROENTGENOGRAMS PER YEAR.

Reports on the number of free roentgenograms made per year were received from only forty-one hospitals, who make more than 45,000, or an average of about 1,097 per hospital, the number of each varying from twenty to 3,000.

Eight of the sixteen roentgenologists, who own their own apparatus, report making 1,300 free radiographs per year, an average of 162 apiece. Six of these supply their own plates and developers, seven are supplied by the hospitals, and three charge the patients a small fee to cover the cost.

AVERAGE COST OF MAINTENANCE.

Interest on cost of equipment ($1,102.63 the average in 57 hospitals) at 6%	$ 66.15
Depreciation per year, at 12%	132.31
Insurance at $1,000 valuation (what author pays)	17.70
Repairs and improvements, per year	100.00
Electricity, per year (light and power)	25.00
Tubes, per year	75.00
Cost of 2194 plates, all sizes, estimated at 35 cents	767.90
(The average of 1097 free patients per hospital per year will require perhaps twice that many plates, or 2194.)	
Cost of developers at 5c per plate	109.70
Total cost, per year	$1,293.76

This makes the average cost per plate about 59c. Where very few plates are made, of course the cost will be much higher. If but 200 plates are made a year, the cost would be about $2.10 each. These figures take no account of roentgenologist's or assistant's time, the care of the room, clean linen, etc., etc.

THE KEEPING OF RECORDS.

Only thirty-three, or 57%, of the fifty-eight hospitals keep a system of records. Seven do not report on this question, and eighteen state definitely that no records are kept. The sys-

tem varies from a book record to an elaborate card index system.

ASSISTANCE.

Only twenty-one, or 36.2%, of the fifty-eight hospitals provide assistants to the roentgenologists, and some of these do not serve continuously enough to be of much service. The trained, permanent assistant prepares the patient, gets the plates ready, develops them, keeps the records, etc., which saves much of the valuable time of the roentgenologist.

ROUTINE USE OF ROENTGEN DIAGNOSIS IN HOSPITALS.

In forty-two, or 72.4%, of the fifty-eight hospitals, roentgenographic diagnosis is a routine procedure in certain special cases, such as injuries to bones and joints, foreign bodies, vesical and renal calculi, diseases of the chest, gastro-intestinal diseases, etc. But few of them, however, make use of the ray as a diagnostic aid in all these classes, particularly the two latter. This requires the services of an experienced and skillful roentgenographer, and many hospitals will not make this field of research sufficiently attractive to secure such services.

In this connection Dr. Carl Beck says: "I am connected with several hospitals which are provided with X-ray apparatus. We use them whenever there is an indication, unconcerned whether there is any recompensation or not. Some of our well-to-do patients are willing to pay a small amount, but as a whole there is a general unwillingness to pay for X-ray examinations. The patients are far from being educated to the importance of the examination. What can you expect from them as long as our colleagues regard skiagraphy as a nice plaything, but dispute its great practical value?" In a paper in the J. A. M. A., April 18, 1908, on "Malunion of Bones," Dr. Beck remarks: "I had opportunity to observe 217 cases of malunion of bones since the early roentgen era, and strange to say most of the cases were not treated by the poor village doctor, but by surgeons of good repute, some of

them leading men. That these men would have well known how to treat these fractures in a blameless manner had they recognized their nature cannot be doubted, but they failed to make use of the roentgen ray before it was too late."

Dr. Chas. Leonard, in a letter to the author, says: "I only hope you can get at the facts, as so many hospitals underpay their roentgenologist, and make him divide his consultation fees received from private patients. They do not do this with the surgeons, although they provide them with as costly apparatus and more expensive equipment."

TREATMENT.

The roentgen ray is used therapeutically in forty, or 68.9%, of the fifty-eight hospitals. Eight of these state that they use it only occasionally. Only thirty report on the number of patients treated annually, which totals 11,000, or an average of 366 per hospital per year. Six roentgenologists receive salaries, but most of the work is free. The treatment is used in various dermatoses, epithelioma of the skin, cancer, sarcoma, leukemia, pseudoleukemia, mycosis fungoides, etc. They report on the results of their treatment in malignant diseases as follows:

In epithelioma thirty-one out of the forty report. Twenty-seven say results are "good" or "excellent." Two say they are "fair," and two say they are "unsatisfactory." In carcinoma, thirty report. Eight say results are good, twelve say results are only temporary relief, and ten say results are unsatisfactory.

In sarcoma seven claim good or fair results, ten temporary benefit, and seven "unsatisfactory."

In leukemia and pseudoleukemia, the verdict is unanimously only temporary improvement.

While great improvement has been made in the roentgen technique, it is not to be presumed that the last word has been said. Its value as a therapeutic agent is sufficiently well recognized in many cutaneous and malignant conditions, to entitle it to a place in the therapeutic armamentarium of every hospital.

CONCLUSIONS.

No hospital aiming at scientific work can afford to be without a complete roentgenological equipment. The roentgenologist is entitled to as much consideration in connection with his department as any other member of the hospital staff. The hospital should pay all expenses connected with his equipment, and the roentgenologist should be paid a salary unless he has opportunity to treat private patients who would pay him regular fees. Such fees should not be divided with the hospital.

The hospital should see that the roentgenologist has suitable quarters to work in. He requires at least two large rooms, which should be well ventilated and be kept clean and free from dust. Many roentgenologists have made martyrs of themselves to science. They can now protect themselves from some of the injurious rays by the judicious use of lead partitions. They should no longer be required to work in little, dinky, dark rooms with little ventilation. Many hours are often spent in the dark room, which at best cannot be very sanitary, but it is possible to have plenty of air space, and it should be insisted upon. There should also be ample and convenient space for the storage of plates, so that they may be properly filed away by an assistant according to a good system, and so that the hospital, and all parties concerned, may have ample protection, and the roentgenologist's valuable time be conserved when it is necessary to look up old plates.

The hospital should provide a competent assistant to the roentgenologist. It should be the duty of this assistant to get patients ready for examination and treatment, keep the X-ray room and dark room in order, develop plates, and keep the records.

X-ray work in hospitals under these conditions will be attractive to most roentgenologists, and hospital service will be greatly improved.

Right

Left

Fig. 10—Infectious arthritis of right wrist with additional centres of ossification.

INFLAMMATION AS A FACTOR IN HASTENING THE DEVELOPMENT OF OSSIFICATION CENTERS.

REPORT OF TWO CASES BY H. W. DACHTLER,

Roentgenologist to St. Vincent's and Toledo Hospitals, Toledo, Ohio.

On February 23, 1909, a girl, three years old, was referred to me by Dr. G. M. Todd, of Toledo, Ohio, for a Roentgenographic examination of the right hip joint. The clinical history was as follows:

Five months ago, the child accidentally received a wound in the side of the face from a "table fork." An abscess developed at the site of the wound which was soon followed by metastatic infection of the joints. The right wrist and left ankle joint were the first to become affected, the right shoulder joint, and one month from the time of injury, the right hip joint also became involved.

There was considerable shortening of the right leg, following the inflammation in the hip, and the patient was referred to me primarily for a Roentgenographic examination of that joint. The Roentgenograph of the right hip joint showed an "infectious arthritis" with considerable destruction of the head of the femur, and acetabulum. For purposes of comparison, I made Roentgenograms of the wrists to determine the changes, if any, which had taken place in those joints.

The Roentgenogram (Plate 10) revealed the following interesting conditions: The right wrist joint shows the destruction due to the infectious process at the lower end of the ulna and radius, and in addition a marked difference in the ossification centers when compared with the left wrist which is normal. The centers of ossification for the os magnum, unciform, and cuneiform bones normal for this age are plainly shown, and in addition to these two others, evidently the centers of ossification for the semilunar and scaphoid bones. On the plate two more points of ossification can be determined,

but on account of their situation partly behind the end of the radius, they do not show in the reproduction given herewith.

Case 2 was a girl, four years old, who was referred to me by Dr. J. H. Jacobson, of Toledo, April 15, 1908, for a Roentgenographic examination of the right ankle joint.

The clinical history was: that one year previously the child began to limp and complain of pain in the right ankle, since which time the ankle has remained inflamed and swollen. The condition had been treated for some time by immobilization and rest upon the assumption that it was a tuberculous infection. On account of a history of tuberculous infection, Roentgenograms of both ankle joints were made. A needle was found imbedded in the right ankle joint near the external malleolus, with evidences of tuberculosis of the joint. In comparing the centers of ossification for the right ankle with those of the left, the right one was found to contain one additional center for the metatarsal bones.

The additional centers of ossification found in these cases, in the presence of long standing inflammation, seem to demonstrate a definite relation between two conditions, an observation which so far as I am able to determine has never been recorded heretofore.

That these findings were normal or accidental can be ruled out for the following reasons: First, a comparison with the healthy opposite joint in each instance revealed the additional centers; secondly, that the ossification was in advance of that which is usual for children of three and four years of age.

The explanation of this advanced ossification can be readily found in the increased nutrition of the parts incident to the hyperemia and congestion of the inflammation.

This observation seems to confirm the beneficial effect claimed by Bier and his followers for their treatment of chronic inflammation by hyperemia.

The therapeutic possibilities which arise from the practical application of artificially produced hyperemia for the purpose of developing bone, open up new avenues for investigation.

The routine X-ray examination of cases of chronic joint disease (tuberculous arthritis, etc.), especially in children treated by the Bier method, may prove a means of determining the effectiveness of that treatment. Rachitis, syphilis of bone, fractures, particularly old ununited fractures, and the bone cavities resulting from operations for the relief of osteomyelitis are a few of the conditions which may be benefited if the ossification and growth of bone can be influenced by active hyperemia.

237 Michigan.

SOME INFLUENCES OF TEMPERATURE IN PHOTOGRAPHY.

BY EDWARD LEAMING, M. D., NEW YORK.

Heat increases and conversely its absence retards or even inhibits chemical action. This fact should be kept in mind by the Roentgenologist in all the work he has to do with the gelatine dry plate. By disregarding it and its application he may be working at a distinct disadvantage, while a proper application of his knowledge of the effects of heat or cold will enable him to produce negatives of superior quality. The very beginning of the dry plate—the making of the emulsion—is generally accomplished by the aid of heat, leaving out of our consideration the making of emulsions by the cold ammonia process. The mixture of hard and soft gelatines is melted together, the silver and bromide salts added, and the emulsion is then boiled; this cooking produces a change that causes the resulting dry plate to be of the rapid variety; it also causes very often a coarse granular texture of the gelatine; long boiling tends to produce decomposition in gelatine. But even the slower emulsions, which are made without boiling, are put aside in a warm room to ripen, if they wish to produce fast plates from them.

We see, then, why we are advised by the text books on photography to keep the dry plates in a cool as well as dry and dimly lighted place. The gelatine dry plate is in an unstable condition. Its very process of manufacture starts up that series of changes which, if the plate be subjected to the continued action of heat in a stuffy dark room, will surely cause fog and final spoiling for photographic purposes.

We all know that dry plates do not keep.

We can use heat as an **aid** in our treatment of the dry plate. The atoms in the molecules of the dry plate are in motion—the action of light causes a disturbance in this motion, and if within a certain time, depending upon the intensity and length

of action of the light, we apply certain solutions having an affinity for oxygen, we will obtain a deposit in the gelatine film. If, however, we allow a long enough period of time to elapse between the exposure of the plate to light and its development, we will get no deposit in the film due to the light action; the disturbance originally set up has had time to subside. This will be most evident in brief exposures to feeble light. Now it is this brief exposure and feeble light action that we have to consider when we attempt instantaneous radiographs.

We fail to get good images; the plates are under exposed.

We find by experiment that dry heat applied to the plate before exposure will cause an accelerated action of the atoms, but that this action will not last long; in other words, heat increases the activity but shortens the duration of the light action. This only obtains when we expose the plate while hot. If we wait after heating until the plate cools again before exposing, we get no perceptible effect other than the original effect of the exposure to light. If, then, we wish to obtain the maximum effect with very brief exposures, we heat the plate protected from light, place it while warm in the desired position for our picture and make our quick exposure. We now allow the plate to cool, when upon development we will find that we have a much better exposed plate than we could get with the same exposure on an unheated plate. X-rays are produced by electrical energy, heat, light and electricity are various manifestations of the same force, or vibratory energy. The photographic action of the X-rays is in every way similar to the action of light rays.

We all know that plates frill and melt in hot weather in the dark room unless some special precautions are taken, and even then we may have trouble. A warm developer will act much quicker and with more energy than a cold one and for that reason is better for quick exposures. But for the same reason, it is apt to cause or bring out fog on the negatives, and the danger line where the film slides off the glass support into the tray is quickly reached. On the other hand cold solu-

tions retard development and with some developers such as hydroquinone, the developing action entirely stops around 40°F. Experience teaches that development proceeds best when the developing solution is kept from 60° to 65°F., and at such temperatures the gelatine does not soften and dissolve; but we may still have that trouble known as frilling. The causes of frilling are several, and we may not prevent it by adopting any one method of procedure, but this much we know—that an almost certain method of causing the plates to frill in warm weather is to have our different baths and the washing water at widely differing temperatures. When we keep all our solutions and the wash water at the same temperature we are less liable to have trouble from frilling. Of course we can resort to alum, but that is another story. The modern method of development, called the factorial method, and the uses of the exposure meter in photography all depend upon the temperature of the developer being within a certain limit of a prearranged standard. If this be not maintained all calculations are thrown out and the elaborate tables and exposure meters rendered valueless.

Finally, those of us who have made valuable lantern slides from our pet negatives, or who keep all their records in the form of lantern slides to save space and weight, are in constant danger of having their best results spoiled by the heat of the projection lantern. Each lantern should of course have a water bath for the protection of the slides, but few do have such an arrangement. Now were the slides absolutely dry when in the lantern all would be well, for the length of time any slide is thrown upon the screen would not normally be enough to do harm. But gelatine is hygroscopic, the air is full of moisture and slides are seldom varnished.

11 East 48th St., New York City.

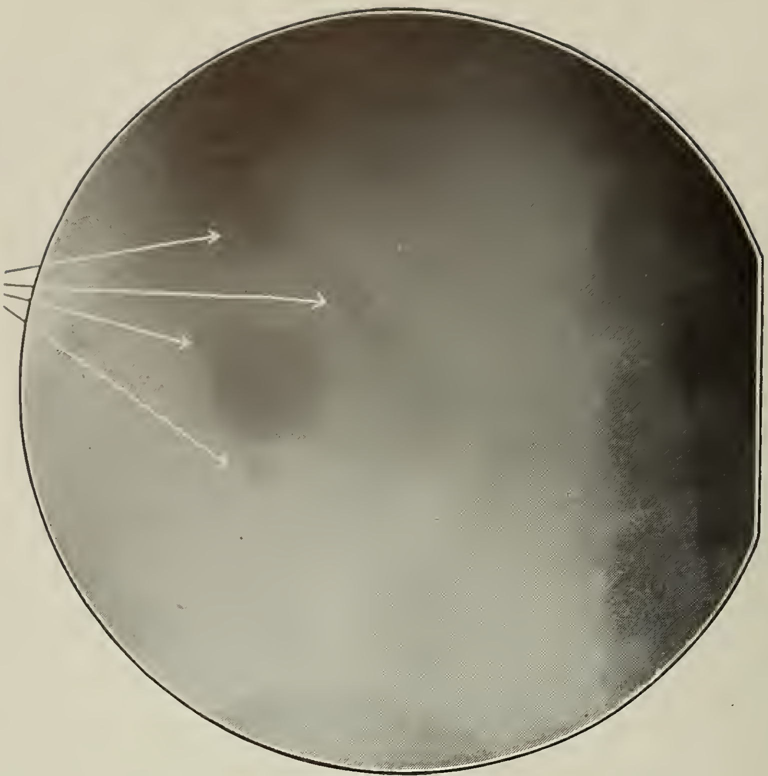


Fig. 11

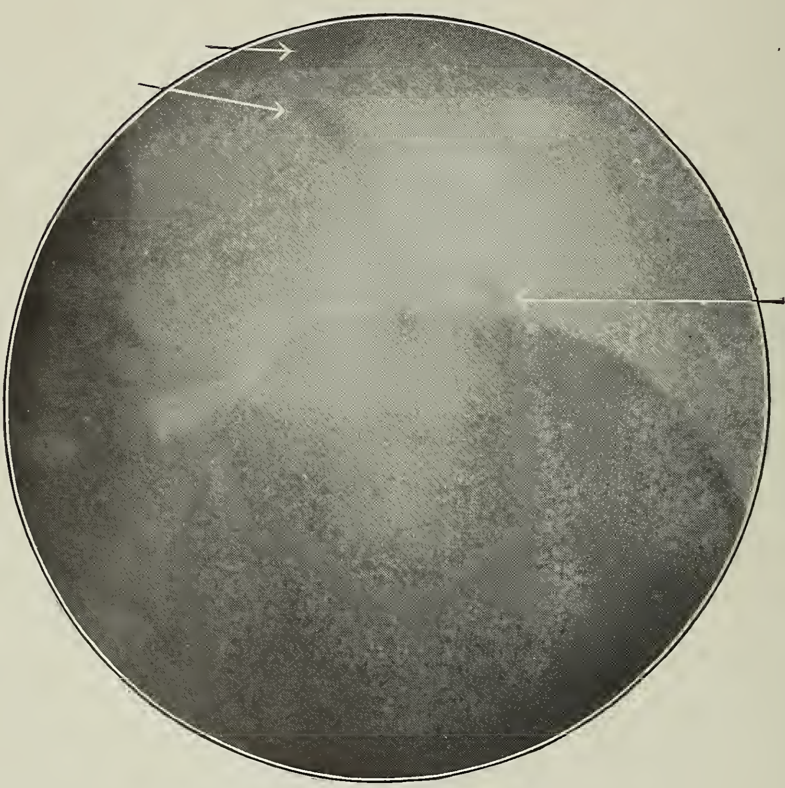


Fig. 12

Plates 11, 12, 13, and 14 contributed by Lewis G. Cole, M. D., New York.

Plates 11 and 12 of a man about forty years old, of whom an examination was made to eliminate the possibility of renal calculus rather than to confirm clinical diagnosis. Plate 11 is of the left kidney, and in the original plate the outline of the kidney is distinctly shown, and indicates an enlarged left kidney, containing one large and four small calculi. On the opposite or right side, as shown in plate 12, are three well defined shadows; two of them are near the tip of the transverse process of the third lumbar vertebra, which is a trifle to the outer side of the normal course of the ureter. The third is the smaller of the three shadows, and is just above the crest of the ilium, and is much further from the median line, and two inches from the normal course of the ureter. All of these shadows are of about equal density. In the report to the attending physician and operating surgeon, the writer made a diagnosis of five calculi, on the left side, and stated that the shadows on the right side were not in the kidney or ureter. An operation, however, was performed on both sides, and on the left side five calculi were found as shown in the radiograph, and on the right side a thorough examination of the kidney and ureter did not reveal any evidence of the calcareous bodies that were shown in the plate. The writer's reason for making a negative diagnosis of calculi on the right side where these three distinct shadows were present, is the fact that all three of these can not possibly be in the ureter. The lower of these calculi is too far down to be in the kidney, unless the kidney is extremely prolapsed, and too far out to be in the ureter. The axis of the other two shadows is not parallel with the course of the ureter, and the density of the larger of these three shadows is not uniform, giving the mottled appearance of a calcified gland, the stroma of which is not as completely calcified as the follicle.

Plate 13. This case, Mrs. B——, about forty years of age, complained of typical symptoms of renal colic, with a moderate amount of pus in the urine. Several radiographs of the region of the right kidney were made, and they all showed a

shadow opposite the tip of the transverse process of the third lumbar vertebra but further out than the normal course of the ureter in this region. The clinical diagnosis of renal calculus was confirmed by the radiographic findings, but on operation no calculus was found in the kidney, but a calculus the size and shape of the one shown in the accompanying plate was present in the gall-bladder. Unfortunately, a plate was not made after the operation and removal of the calculus to show whether or not this shadow still existed. This case is not published to demonstrate the possibility of showing certain kinds of gall stones, but to demonstrate how readily a gall stone of sufficient density may be mistaken for a renal calculus on the right side. The blurred appearance of the edges of the stone is the only thing that would make one suspicious that it was nearer the anterior than the posterior surface, and had a radiograph been made with the plate anteriorally, it would undoubtedly have given a much clearer defined shadow.

Plate 14. This roentgenogram was from a woman about twenty-eight years old, who had typical attacks of renal colic. A ureteral catheterization with a waxed tipped catheter had revealed evidence of a calculus on the left side. Radiographs were made by another radiologist, extending from the first vertebra to the pubis and no calculus was shown. Subsequent ureteral catheterization allowed free passage of a wax tipped catheter, with no obstruction to the catheter, and without scratching the wax tip. Although the patient was prepared for a nephrotomy, the operation was postponed on account of no calculus being shown in the X-ray, or by ureteral catheterization. The symptoms continued, and a series of radiographs were made, all showing the calculus very distinctly, near the lower end of the left ureter. This diagnosis was subsequently verified by operation. I am unable to state why this calculus was not shown in the previous radiographs, but this case demonstrates that it is possible for a waxed tipped catheter to be passed by a calculus in the lumen of the ureter without giving any obstruction, and without giving a scratch on the wax tip.

Fig. 13

Fig 14

SPEED MANIA.

BY LEWIS G. COLE, M. D., NEW YORK.

Considering the events of the present day it is little wonder that the Roentgenologist has become infected with speed mania. It was stated in an editorial that the keynote of the last X-Ray Congress was speed in radiography. The first thing one X-ray man says to another is "how fast can you do it," and a man's standing in the eyes of his colleagues depends on how fast he can make a radiograph instead of how much detail he can show. It is doubtful if any one was more anxious than the writer to diminish the time from minutes to seconds, and we all realize the necessity of making radiographs while the patient can hold his breath.

But it is time for us to ask ourselves if we are not trying to overdo the matter of speed. We realize that absolute absence of motion is essential to good detail, and within certain limits the shorter the exposure the less likely the patient is to move, and in chest and abdominal radiography the time should not exceed the time the patient can hold his breath.

The advantages of extremely rapid exposure are that the patient is less likely to move voluntarily, and especially in children this is valuable, and there is less involuntary motion which is of especial value in stomach radiographs.

Since the last meeting the writer has compared carefully radiographs made in extremely short time with a transformer with those of longer exposure, both with the transformer and coil, and where the question of voluntary motion is eliminated the results were eminently more satisfactory where the apparatus and tube were not pushed to their extreme limit. The disadvantages of extremely short exposures are as follows:

The destruction of the tubes.—It is a sad fact well known to all of us that comparatively few tubes are satisfactory, or perhaps I should say that occasionally we get a tube that is, or becomes from use far superior to the ordinary ones, and that

with such a tube all our best work is done. With the extreme output of a four K. W. apparatus the writer was able to make a satisfactory negative of a kidney region in three seconds and of a chest in about 3/5 of a second with an old thoroughly seasoned pet tube, but unfortunately those old pet tubes only lasted for three or four such exposures, and the detail in such plates was not as good as could be obtained by a much longer exposure. The practice required by such short exposures of arranging the tube rheostat and switches so that the entire output of the apparatus was jammed through the tube all at once, lead to many failures, because one did not have time to see what the tube was doing, and the current was frequently far in excess of what the tube would stand. The results were many failures, the destruction of old seasoned tubes and joy to the manufacturers.

I then tried relatively long exposures from ten to fifteen seconds for kidneys, and from three to five seconds for lungs, using very much less energy through the tube, and the results were very gratifying. I was able to turn on the switch and advance the rheostat gradually and see when the tube began to become excited and gradually increase the current until I could judge from the appearance of the tube that it would be unwise to use more, and in this way the destruction of the tubes was reduced to a minimum and it was seldom that there was a failure. Occasionally, apparently by a fine adjustment of the amount of current to the vacuum, exceptionally good negatives would result, but the time on these would be relatively long.

The claim of those who favor rapid exposures in chest radiography is that it shows the heart at rest. Considering the fact that the heart beats more than sixty per minute, or one complete cycle in a second, it would go through an entire systole or diastole in one-half a second, it would require one-fourth of a second at least to show the heart at rest, and the speaker even with the entire output of a 4 K. W. apparatus with a seasoned tube could not make a thoroughly exposed negative in less than half a second. Therefore even theoretic-

ally the heart is not at rest for a sufficient time to show it in a radiograph. Many radiographs of three or four seconds show the outline of the heart as distinctly as any I have seen of shorter exposure.

I would therefore suggest that the keynote of this meeting be not speed in radiography but detail.

DISCUSSION.

DR. P. M. HICKEY, DETROIT, MICHIGAN.

We must also keep in mind that a radiogram is a record of density, because by doing so we can discuss these matters more clearly. We should also remember that the first records on plates which were made in this country of the human face required a direct exposure in the sunlight for several hours, and it was felt that a very wonderful feat had been performed. Compare things as they were then with what they are today. If, then, the roentgenogram is a record of density, if the part moves while this record is being made, it is at the expense of accuracy in the roentgenogram. So that from a purely theoretical standpoint speed mania in roentgenography is the thing to be sought. I remember what one of our members said some years ago, when we were discussing the claim of a certain manufacturer. He said that if his machine could make a hip in one or two minutes, he would wire an order at once. That will recall to our minds the changes that are made year after year.

Another point that occurred to me in the discussion of this paper which is really an adjunct to speed is the use of a rapid plate. If we use a plate with an emulsion which is rapid, and which will give us a record, well and good. If we use an emulsion which is so rapid that the resulting record is not clearly depicted, we are hurting our work. Personally, I do not feel that we will ever obtain the speed in roentgenography that we really require. Stop and think how much a chest moves as the result of cardiac impulse and the pulsation of

the vessels. Pass a bronchoscope and watch the movements, and you will want to make your plates in a very much shorter time than you do now. This question of how fast we should take plates is a mere matter of detail. We dislike to have anyone ask us how fast we made a certain photograph, because that is a mere matter of technic.

I agree with Dr. Cole that we should endeavor to produce the very best roentgenogram possible. When a photographer sets out to photograph a house, an ordinary horse, he usually does not take the picture with the same speed as he takes a race horse. We must study the different conditions, just as the photographer does. I agree with Dr. Cole as to the taking of two roentgenograms, for instance, of a hip. If a hip is properly immobilized, it does away with much of the necessity for speed, and that is true of other parts of the body. In that connection I have been very much impressed, and unfavorably so, with the carelessness of various men in different parts of the country. A few days ago I saw a man make a picture of a child's hip. The child was only four years old, and the roentgenographer simply told the child to keep still. The exposure lasted a few seconds, and during that time the child moved its foot several times. I have no doubt that there was considerable blurring on that plate.

With regard to the smashing of tubes, that is simply a minor detail. We must encourage the manufacturers to produce a better tube than we have now, and yet the tubes of today are very much better than were those of five years ago. Take a tube that was made five years ago, and pass through it the current we use today, and see what will happen. It should be our desire, as it is that of the manufacturer, to produce a tube that will stand up under the current we send through it today, but if a tube goes to pieces now and then, we must not be discouraged, because better tubes are being made every day.

DR. GEORGE E. PFAHLER, PHILADELPHIA.

I feel that I cannot add very much to this subject. Although the title of Dr. Cole's paper might lead one to believe that he

is not a speed maniac, I think he does not differ from any of the rest of us in that respect. Our first object must be to keep the parts still in order to get a clear picture on the plate, and if you are going to photograph the moving parts of the body, such as the diaphragm, lungs, intestines, stomach, you will have to do it in a period of time that is shorter than the time required for the organ to move. The arms, legs and joints of the body can be immobilized and we need not worry about speed. We can make an exposure lasting five minutes or ten minutes or as long as may be necessary; but the difference between one second and twenty seconds is immaterial when we photograph these parts of the body. When we photograph the lungs, we must do so while the patient holds the breath; that is, we must shorten the time of exposure considerably. If we are going to photograph the peristaltic wave in the stomach, we must do it in a second, because not more than twenty seconds are required for the wave to start at the body of the stomach and end at the pyloric end. In the majority of cases we do not require that wave to be shown in sharp detail; a blur is sometimes sufficient, so that is not a very serious disadvantage. When we see the blur, we know that the wave has passed. When it is recorded as a single identation, we do not get a great deal more information. After all, motion is best studied fluoroscopically.

I agree with Dr. Cole that the first object is to get detail in our plates. It does not matter how much time is consumed in getting that detail, so long as we get the detail. I judge a man's work by the detail he gets without paying any attention whatever to the time consumed in getting it. We must have good detail to get a good pathologic picture. Some parts of the body must be photographed in a minute, others in a second or even a fraction of a second, but we must get good results. The only advantage that I can see in using speed for all work is to bring up your technic so that you can do good work in those parts of the body where speed is necessary.

DR. EUGENE W. CALDWELL, NEW YORK CITY.

In 1898 or 1899 I read an article entitled "Instantaneous Radiography," so that I fear I must be placed in the speed mania class. However, there is not very much difference of opinion because we are all agreed that we must have good plates and that very many radiographs cannot be made with a long exposure. As Dr. Pfahler pointed out, it is necessary, even important, in many cases to have speed, and in order to do that we must develop a technic that will enable us to work fast in those cases where speed is essential. On the other hand, there are many interesting things about the speed question. I am convinced that when we get a satisfactory appliance for producing a current for the excitation of X-ray tubes, the speed problem will to a great extent disappear, and with it many of the troubles of the tube manufacturer. The appliances we have to use now are practically either the coil and transformer or the static machine, and it is my firm belief that neither of these has yet been brought to anything more than a crude stage of development. When we can get a device for exciting tubes, a high tube, with one hundred milliamperes, we can get all the speed that we need for any sort of work. So far as I know, there is no such appliance available at present.

The coil, which I believe is as fast, if not faster than any other appliance made, sends through a tube a very strong current for a very short time. When the milliampere meter reads twenty milliamperes, the tube is receiving in a short space of time a current of something like five hundred milliamperes, and I believe that I can show that I have passed one thousand milliamperes through a tube for a short time, although it is that which spoils the tubes of which we think so much. If we had a device that would pass the same quantity of current through a tube over a longer period of time, we could get better results and save our tubes. The reason the coil does not do it is because it is idle during about ninety per cent. of the time that it is in action, and I believe it is nearer 98 than 90 per cent. Through the tube there goes a flash of a very strong

current measured in hundreds of milliamperes, and then no current at all until you get another interruption.

The transformer, it seems to me, has some advantages in this respect, together with certain disadvantages. It has been demonstrated that the wave currents are longer when they emanate from the static machine than when they come from the coil. It follows from this that the wave is flatter, and that the maximum current at no time reaches so great a point as with the coil, consequently you are not straining the tube to the same extent. With the static machine you get a continuous current, and that is the ideal current, but we all know that the static machine is very far from being an ideal machine, although within the past few years some very extraordinary machines have been built, machines which I think compare in speed with the coils and the transformer. Some day we will have a device which probably will be electro-magnetic, which will give us the sort of current we need to make these short exposures without straining our tubes.

As to the necessity for short exposures, I think we must all agree that they are what we must have, although some of us have not appreciated sufficiently what can be done with a short exposure. Anyone who has worked in a dispensary to which come children of all ages, speaking all languages, or no language, will realize how useless it is to tell a four-year-old child to hold his breath or to keep still, especially when the child does not understand what you are saying. Then, most of us have had the experience of trying to radiograph the hip-joint of a child that showed its appreciation of the society of the roentgenologist by indulging in long and continued sobbing. That is a case where speed is necessary. If you watch a child sobbing, you will see that there is a point where his respirations become long, as when he gasps for breath, and there is an instant when it holds pretty still. That is the time to make that hip, but it cannot be done in minutes, nor in twenty seconds.

Even in the case of adults, the thorax cases especially, the patient is troubled with embarrassed respira-

tion, so that he cannot hold the breath as long as a normal individual. I have made experiments on myself, and once, while lying down, and with proper respiration beforehand, I was able to go without breathing for over two minutes. I find, however, that the average individual sent in for an examination of the lungs is very likely to have a perceptible movement of the diaphragm in five seconds, and I have seen evidence of movement of the diaphragm and lung in exposures of one second. If we could make an exposure of a lung in one-hundredth of a second, it would be about right. And I think it is coming. Dessauer claims to have done it already, but he admits that the best of his plates were only a little under-exposed.

This is a subject which lends itself to unlimited discussion, but I agree with nearly everything Dr. Cole has said, except the desirability of keeping at it until we do get that speed.

DR. VERNON J. WILLEY, ROCHESTER, MINNESOTA.

I am glad the discussion has established that we do not get detail by speed. We have been told times without number by different men who worked with high speed that if we want to get detail we must make the plate in the shortest possible time. Of course, we have to sacrifice something if we expect to get good plates of parts that are likely to be in motion or that are in cyclic motion. At the present time we use for that purpose high currents, high tubes and plates coated with rapid emulsions. Personally, I have never been able to get as good negatives with a rapid emulsion plate as when using one that was coated with a little slower emulsion. Nor have I gotten the detail on a plate from a hard tube that I can get with a medium tube or one that is lower than Walter 6. Nor do I think that we can get as good detail with the heaviest possible currents, as we can get with a weaker current or more rapid interruptions. To secure the greatest detail we must wait and work toward the development of a generator, such as Dr. Caldwell suggested. When we have a generator that gives a very constant potential and a constant current, then we shall have a volume of rays that instead of beginning at about

Walter 1 or 2 and climbing to 8, then dropping back so that there is neither constancy of penetration of rays nor constancy of current, when we get such a generator and such conditions, we shall be able to do successful rapid radiography without sacrificing detail or tube. It is imperative to have considerable speed in producing radiographic plates where immobility is not possible, but this is confined for the most part at the present time to the radiography of the heart, lungs and abdominal organs.

I was particularly pleased when I thought of how I had produced my best plates by relatively slow exposures when Dr. Hickey was advocating rapid exposures, and I have watched him when he produced his best plates to see how exceedingly conservative he was in carrying out the rapid exposure. Some of the men who have advocated speed, and who tell us how quickly they make a chest plate, do not always do as they say. I have seen them produce the most beautiful thoracic plates with exposures of from half a second to three and five seconds, instead of in one-tenth or one-twenty-fifth of a second. I have attempted to produce such rapid plates, but all I succeeded in doing was to spoil some of my best tubes. There is no doubt but the instantaneous exposure is one of the greatest things to be accomplished, one of the things we desire most strongly, but we must not sacrifice detail or beauty of plate, because it is perfection of detail on which we base our diagnosis. That is what we are more concerned with than in anything else, and when we succeed in making rapid exposures without sacrifices, it is a point gained, but it seems to me that in radiography of the extremities or joints we can get better plates by making a little bit slower exposure, using a little bit softer tube, and not trying to send too heavy a current through the tube.

DR. M. K. KASSABIAN, PHILADELPHIA.

I often have to radiograph insane patients and children who do not understand what you say to them, or they get excited, so that I make it a rule to give them a hypodermic of mor-

phine before they come to the X-ray room. That quiets the person, but whether that can be done in private practice, I do not know. I have very few things in the room the patient enters, because when he sees big machines, tubes and apparatus of all kinds, he is frightened. For children I use very soft tubes, so that they will not spark too much and scare them. Then, too, children can be given a little chloroform without being harmed in any way. I have often done this in my private practice. Then, again, I take time to show the patient the spark, so that he will get used to it, and after a little while you can make a very good plate without any trouble whatever.

DR. CALDWELL.

What Dr. Kassabian said about the ether or chloroform brings to my mind the case of a negro child, eighteen months old, which was chloroformed on my table. The doctor who administered the anesthetic left before the child woke up, but I stayed there four hours trying to bring the child out from under the anesthesia. It is also well to inquire whether the child has congenital syphilis before you give it any chloroform.

DR. D. R. BOWEN, TROY, N. Y.

I am very much interested in this question. Any of us can hear of an unexpected death from chloroform, the death occurring after the first three or four or five whiffs, the death which renders you absolutely helpless, and you cannot do anything for the patient. It is not necessary to use chloroform; you can use ether just as well, and get the same results that you do from chloroform. It is needless to have a secondary stage of excitement, and these people do not die. I have known of a child, four years old, dying under chloroform anesthesia given for the purpose of placing three or four stitches in the case of an incised wound. I do not think that chloroform anesthesia is necessary to get a good radiogram. On the other hand, we can always give a hypodermic of morphine, and many of these patients, who are suffering pain, get needed relief in this way.

DR. PERCY BROWN, BOSTON.

In Boston it is almost heresy to breathe the word chloroform because Boston is the birthplace of ether, and all operations are performed under ether. I think, however, that far better results can be obtained by personal persuasion, if the child is of a reasoning age, or by attracting the attention of the child by some other means, because the administration of ether produces the same respiratory effect as when children sob. I think anesthesia, whether chloroform or ether, is something to be avoided, if possible. Of course, there are cases where it does not make much difference, but it seems to me that anesthesia is inferior to the more psychological method of producing quiet.

DR. CHARLES LESTER LEONARD, PHILADELPHIA.

You will recall that it is not very many years ago when you heard me talking about making calculus plates in eight or ten minutes, when the rest of you were making them in five minutes. In the exhibit you will find some pictures I made, showing the heart standing still, and you can believe me when I say that these pictures were made in one-fourth of a second. Some stomach plates I have were made in one second exposure. I can also tell you that you will not get the peristalsis of the small intestine with a one second exposure. The change of speed as I have found it lies in the fact that you get detail of the soft structures, of the hard structures, of the whole picture. Look at the plates, and you will see the structure of the spinal column with the patient lying on the abdomen. I do not believe that you can get that in a time exposure.

With reference to tubes: All the plates I have on exhibit were made with the same tube, one which I have used for two years. I have not smashed a tube by making fast exposures, although I have punctured one. The walls of the tube got so black that the rays would not penetrate it. I had that tube repaired. The anode has a hole in it, but the tube still makes sharp pictures with a short exposure. I began my work at the

time with a new machine to see how fast I could use it, and I have used it that way ever since. The value of it is not alone in the ability to produce detail, by cutting out motion of the heart in thoracic plates, or cutting out the intestinal peristaltic waves in abdominal plates, but also in getting tissue detail no matter what part of the body is skiagraphed. Use your plate and tube with the idea of getting the best contrast, no matter what sort of plate you are making, whether of bones, of lungs, or abdominal organs. Get detail. I showed a hydrostatic condition of the hip joint so that you can see the distended capsule of the joint, the fluid in it, the ligaments about the joint and the muscles of the thigh. But that detail goes with speed. You will find that proven more and more definitely. It does not depend on whether the vacuum is high or low. You want to make your plates so that you can make a diagnosis from them. The plate must always be made with the idea of looking for the pathologic lesion which you expect to find or exclude.

Quite recently I had a subject which required the longest exposure I have ever given with the tube I mentioned. It was a twenty seconds exposure. The man was center rush on a football team for two years, and it was like getting contrast out of bone rather than out of muscle. The point I wish to make particularly is that speed is of value in producing detail. That the adaptation of the quality of light in the tube gives you more or less penetration, dependent on the vacuum, and that both high and low vacuum, with speed, give the desired detail.

DR. GEORGE C. JOHNSTON, PITTSBURG.

So far as I can see, the only reason for speed in radiography is to secure immobility of a part during examination. If immobility can be obtained by mechanical means, then speed is unnecessary, even undesirable. The first requisite of a successful skiagram is that it shall show the structures in such manner as to permit of differentiation of all anatomic struc-

tures through which the ray has passed or as many of them as it is possible to show.

The principal fault we all observe when we watch other men work is in their attempts to obtain immobility. I did X-ray work for quite a number of years before I had any conception of what that meant. I learned my first lesson in that work from Dr. Cole, and I thought he was a perfect old woman in the way he went about to get a good picture. I thought it was absolutely unnecessary to do all the things he did, and yet I realize that his pictures were superior to anything I was getting out. The great secret of it all was that he was a crank on the subject of immobility. Then it occurred to me that there might be something in it. I made pictures of children, and I often wished that they had more bone salts in their bones when the matter was the children were moving. Then the lesson was driven home by a series of skiagrams made by Dr. Cole from the cadaver. That was the solution of the whole problem. I saw that to make such pictures as he made there must be absolute immobility of all the tissues and since then I have done considerable work along that line and I now have things so arranged that I can keep my patient quite still.

I use sandbags and compressors of all kinds. I never let the patients eat anything before they come to me. These examinations are always made in the morning. Even in sinus work immobility is essential. It is ridiculous to attempt to make a picture when the chin moves with every heart beat. I have a device for holding that chin absolutely still. I ask the patient to move the head, and if he can, I screw up my device until movement is no longer possible. In making a lateral view I also use compression, putting the plate against a solid block. so that compression can be made safely, and I surround the head with sandbags so that it cannot move. In that way you will get a good picture. You can use the kind of tube you want, you can use the energy that that tube can efficiently transform, you get away from the inverse discharge and all secondary rays and you can use the plate with an emulsion so slow that the grain can be made fine enough so that the plate

does not fog. The slow iso plates with extremely fine emulsion are the best.

For the last two years I have used in every exposure plates not larger than 10 by 12, two plates, face to face, one a slow emulsion, the other a fast emulsion. In every case, without exception, where the exposure was correct the slow plate was infinitely the superior of the two.

Ultimately, of course, the question of speed is bound to come up in stomach work. It is absolutely necessary, as we all know. In the location of foreign bodies in the lung, where removal with the bronchoscope is necessary, with the patient suffering more or less from dyspnea, there is much difficulty to be met in making a picture. A short exposure is necessary, and detail must be sacrificed to some extent.

When a child is to be examined, and it absolutely refuses to hold still, I have a professional anesthetist give nitrous oxide and oxygen, so that I never anticipate any trouble. Only enough is given to quiet the child. The inhaler is removed quickly, for fifty or sixty seconds there is absolutely no motion, and that is sufficient time in which to get a good picture. Neither is there any nausea or vomiting following the anesthesia, as is the case when chloroform is given. Anyway, I never allow anyone to give chloroform in my office.

Where the larynx is to be examined, speed is, of course, essential, and the same thing is true in other instances, but the making of extremely rapid exposures for the determination of spinal troubles or hip troubles is to my mind an absolute fallacy. I find that better detail can be secured with a slow exposure. Moreover, it takes the X-ray tube some time to get into action. I allow a few minutes for the tube to get into action. The current is invariably turned on with the rheostat, and turned off with it, except where rapid exposures are to be made. When making pictures of children whom you do not want to anesthetize, I find it a good plan to talk to the child and make a couple of time exposures. When the child is too young to understand me, or when it cannot speak English, I

blow a very shrill whistle with considerable force. The noise petrifies the child long enough so that I can make a very good exposure. That scheme has helped me out very many times.

DR. COLE (closing).

I am delighted to get out of this without being criticized worse than I have. I believe you realize that the object of my paper was to elicit discussion. In the paper I mentioned the necessity and advantage of the short exposures where motion could not be done away with entirely. I think that the standpoint of speed changes. Sometimes we go to the limit of speed. They have come to the limit of speed in photography. We should use a slow exposure where we can, and only use the fast exposure when we must.

Dr. Willey expressed my views for me much better than I did in my paper. He brought out all the facts that I intended to mention and made all the points I intended to make. The fact that speed is not the only essential for detail is the point I want to maintain. Making extremely rapid plates is not the only essential nor the prime essential to getting the best detail in a plate. I do not believe that we should sacrifice detail for speed, as some of us are perhaps inclined to do.

In response to Dr. Caldwell's remarks, I would not for a moment discourage anything which would increase the efficiency of apparatus to do a thing in the one-hundredth or one-thousandth part of a second. I am sure none of you will believe that I am advocating being satisfied with what we have, either in technic or in results, and I do hope that Dr. Caldwell will succeed in producing the ideal generator which will give us the necessary detail with the shortest possible exposure.

In regard to Dr. Leonard's discussion, I am not quite sure whether he intended to make the statement that speed was alone the essential, or the prime essential, in obtaining detail. If that is so, I must take exception to it. It is an important factor and a necessary factor where there is motion, but the

mere fact of being able to produce a plate in a very short period of time will not guarantee that you have the detail which you can get with a long exposure.

In regard to the detail which Dr. Leonard spoke of, in the case of fluid in the hip joints, with an old tube, a portable apparatus, and the patient in bed, I was fortunate enough to obtain one plate out of six that showed the capsule distended as distinctly as anything I could desire. It was one of the few freak plates I have made, and it makes me ambitious to show the detail that we all know it is possible to obtain on certain occasions. The exposure, under the most unfavorable circumstances, was from fifteen to thirty seconds. It was not the speed, however, which gave me the detail in that plate.

Dr. Johnston said that one of the principal indications for speed is when we want to show a foreign body in the lung. I had a patient who inhaled two tacks. They were both on the same side. My assistant made the plate and although it was somewhat blurred, the tacks showed very distinctly. They were extracted. About two weeks ago the patient came back to the office complaining that she had the same whistling in her throat as before, and naturally she thought she had some more tacks in her lung. I made a plate and found one tack in the right lung and another in the left lung. At the suggestion of Dr. Johnston, I radiographed the abdomen and found any quantity of tacks there. Here were two tacks well out in each bronchus, one on the left side, the other on the right side, showing in the radiograph made in from seven to eight seconds, and the points of the tacks were as fine and clean-cut as though the tacks had been set on a table with the plate behind them. Dr. Hickey may see the movements of the lung bronchoscopically, but he saw the shadow of these tacks because they were not moving.

I feel reasonably sure that we are not very far apart in this matter, and I am willing to concede that it is necessary to make short exposures of moving parts, but the one thing on which we do not agree is that speed is the primarily essential point in obtaining detail.

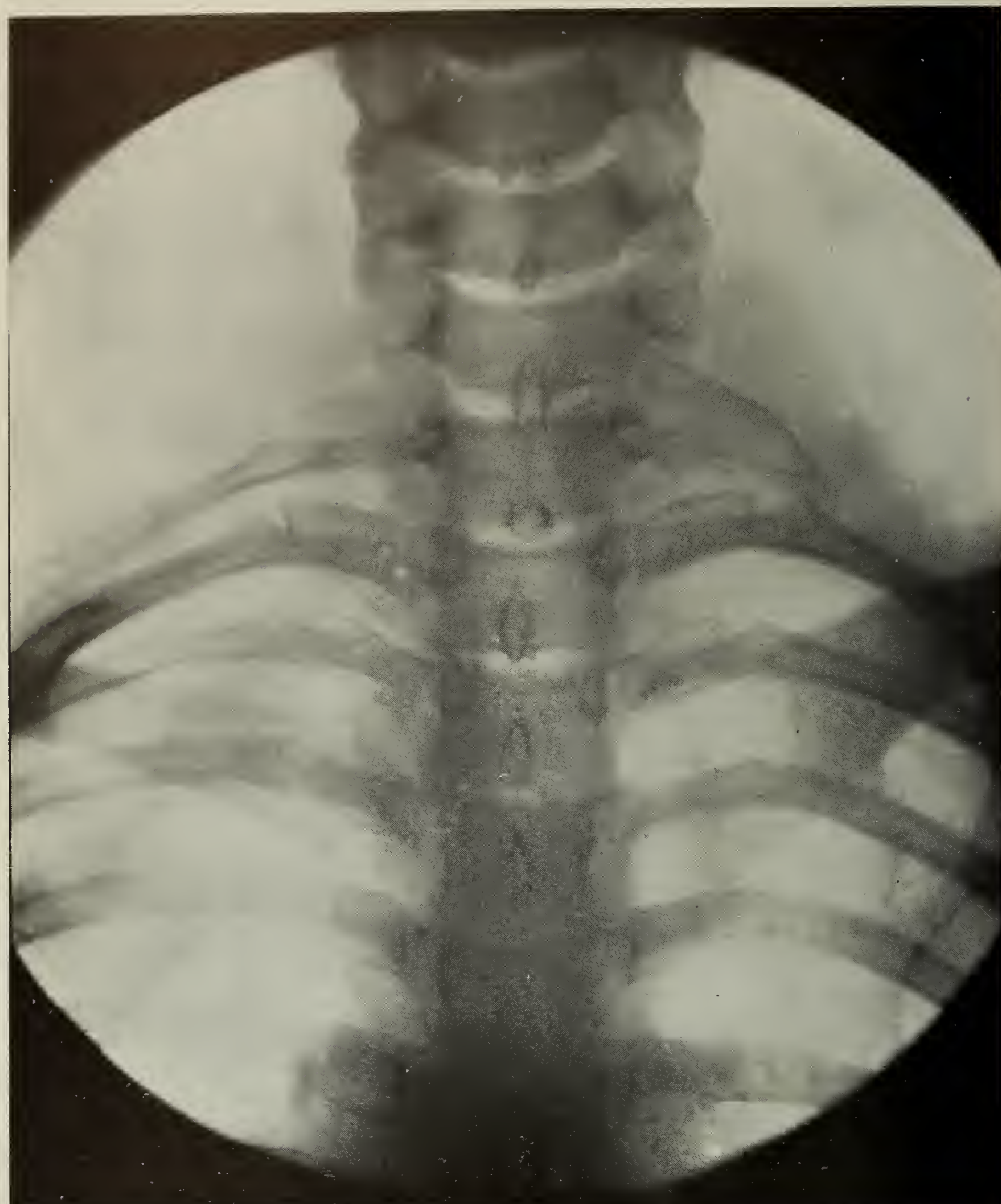


FIG. 15—Bilateral cervical ribs.
Negative by Dr. R. D. Carman, St. Louis.

ROENTGENOLOGICAL BERLIN.

BY EDWARD HOLMAN SKINNER, M. D., OF KANSAS CITY.

The first impression of the roentgen work in Berlin is that of the wide and general use of the roentgen ray in all departments of medicine and surgery for both diagnostic and therapeutic purposes. It is extremely satisfactory to note the careful and attentive use of the x-ray in the internal medical clinics as a check or means of corroborating the clinical examination. They consider that a heart, lung or abdominal diagnosis is not complete without the roentgen examination. This examination not only supplements and substantiates the clinical history but also furnishes an exact means of recording the "projected pathological" picture. From the standpoint of the clinician visiting Berlin, the use and value of the roentgen ray is eminently satisfactory. From the standpoint of the observing roentgenologist, there is still an apparent lack of protection. This carelessness, however, portends no harm to other than the operator and his assistants. But when one stops to consider that up to the present time, over 150 have been victims of the continued action of the roentgen ray in Germany, and some 25 in England, and over 12 in America, then should the director of every roentgen installation take every precaution possible.

Suffice it to say, that one who has spent only two months in Berlin should not take the liberty of stating positive conclusions on the roentgen work of Berlin. One can only relate impressions and beg the indulgence of his readers and those referred to, for any errors. It is needless to add that this is all written in the attitude of a friendly observer and not as a scientific criticism.

The foreigner entering Berlin would naturally first look up the roentgenologists whose names have been associated with this department of medicine since its inception. Among these appear the names of Levy-Dorn, Immelman, Grunmach,

Davidsohn, Cohn, Schmidt, Kronmayer. If I have overlooked other important names, I have the honor to ask the pardon of such men and shall attribute my failure to my limited, though perhaps inexcusable, knowledge of German roentgenologists.

At this point it may be opportune to relate the manner in which the roentgenologists work in conjunction with hospitals and clinics.

At some of the large hospitals, such as Rudolph Virchow Krankenhaus, Moabit Krankenhaus and others, there is but the one large and comprehensive roentgen installation. This is in charge of a leading roentgenologist, who spends probably two hours of the day regularly at the hospital where he organizes and supervises the work and makes the interpretations and reports of the negatives of the previous day. For these services he receives a salary of an extremely modest sum. Attached to the laboratory there may be a permanent assistant or an interne of the hospital. There is always a large number of sisters or orderlies attached to the department, who become quite capable and valuable.

At other hospitals of lesser capacity than the above, one frequently finds a sister in charge, who makes exposures for both diagnostic and therapeutic purposes at the order of the attending physicians. While I have frequently found good negatives at such hospitals, it is nevertheless quite apparent that the work lacks woefully in scientific exactness and there is a carelessness regarding protection of workers and patients. This can easily be attributed to the lack of roentgen knowledge and supervision.

Then there is a third division of roentgen installations. In one hospital, The Charite, there are several installations; one being in conjunction with each of the large Polikliniks for Internal medicine, Surgery, Orthopaedics, Ear, Nose and Throat, etc.

At these installations is found one of the Privat-Docents or assistants in charge, with capable helpers. Here is found the most extensive use of the roentgen ray and its scientific and practical adaptation to the various specialties. It is quite pleasing to see every heart case presented at Prof. Kraus'

clinic with an orthodiagram of the thorax. While these installations may lack in roentgen technique, they may be excused for this, in that they are doing such magnificent missionary work in showing the necessity of the adoption of the roentgen ray as an exact method of diagnosis in medicine and surgery.

From this general consideration, let us pass to the description of individual hospital installations. The first that comes to mind is naturally the largest and most modern: that at the new Rudolph Virchow Krankenhaus under the direction of Prof. Dr. Levy-Dorn. The roentgen-institut occupies a separate three story building of pleasing exterior and well designed interior arrangements. The ground-floor consists of three roentgen rooms; one each for surgical exposures, fluoroscopy and a treatment room. On this floor there is also an office, waiting rooms for men and women, and a dark room. The second floor is given over to a photographic and light therapy department. And the third floor contains ample room for viewing and storing negatives and records. Dr. Levy-Dorn has both the Hoch-Spannung and Induction apparatus for roentgen exposures and uses a Grisson-Condensator apparatus for fluoroscopic work. The roentgen institute at Rudolph Virchow shows at the first glance that it was designed by a master mind in roentgen technique and no expense has been spared in making this a model installation.

The roentgen installation at Moabit Krankenhaus is located in the operating pavilion. Dr. Max Cohn is the director of this most practical institute. One sees a most satisfactory technique for abdominal diagnosis at Moabit. There is a very apparent atmosphere of improvement in exact technique and apparatus under Dr. Cohn's direction. And it is truly gratifying to note that the Bismuth meal according to the formula of Dr. Cohn is relished by the patients and also furnishes excellent shadows for the fluoroscopic screen and the negative.

Several of the installations at the Charite present interesting observations. That under the Klinik for Internal Medicine of Geh. Rat. Prof. Kraus and in charge of Privat-Docent von Bergman is in constant use for heart and lung diagnosis and

also for lesions of the alimentary tract. Prof. Kraus is favorably inclined to the extensive use of the roentgen ray in internal medicine and the roentgen diagnoses presented in his clinic are an ample proof of the correctness of his advanced stand.

The installation in the Ear, Nose and Throat clinic in charge of Dr. Oertel is extremely neat, simple and exact. Dr. Oertel favors the use of the sitting position for head negatives, stating that in this position there is less blood in the vessels of the head and consequently less confusing opacities upon the roentgen negative. He has devised a clever head and body fixing apparatus and recommends a medium hard tube for good sinus definition.

There are several private installations, which for many clever devices and special arrangements would warrant description. But the limited space forces the writer to forego the pleasure of complimenting them individually, as I do here now, collectively, praise them.

The keen competition of the manufacturers in Berlin is one reason for the variety and completeness exhibited in the various hospitals of Berlin. On the other hand, one must not lose sight of the fact that the profession of Berlin has probably come to the point where they demand good roentgen installations, as this method of diagnosis leads to exactness and finality in the examination of the patient. If the physical signs and the chemical analysis and the roentgen examination coincide, there can be no possible doubt. And if they do not coincide there is always some good and demonstrable reason for this fault, that can usually be cleared up by improving the hearing or the eyesight of the clinician; by a thorough testing of reagents and cleansing of test-tubes by the chemist, or by the increased knowledge of the value and correct interpretation of fluoroscopic or radiographic shadows by the roentgenologist.

Permit me in closing to express my appreciation of the cordial reception afforded me by the Berlin roentgenologists whom it was my pleasure and privilege to meet in their own laboratories.

Berlin, November 25, 1909.

EDITORIAL.

Message From the President.

To the Members of the American Roentgen Ray Society:

Prepare now for the next annual meeting to be held at the Cadillac Hotel, in Detroit, Sept. 29th, 30th, and Oct. 1st.

Send the title of your paper to the president or to Dr. Henry K. Pancoast (Chairman of the Executive Committee), Philadelphia, Pa. The program is being made up now and a number of important papers are already listed.

Use the regular application blank in securing one *good* new member. It must be signed by two members in good standing. The applicant can only be elected at the annual meeting. The dues are $10.00, payable after election, but by the payment of $5.00, one can obtain the Quarterly for the year.

Write up one or two of your most interesting cases, with a brief description of the roentgenographic findings. Use about one hundred words for each case. This will be published in the proceedings, and, if of sufficient importance, the Roentgenograph will also be published. Bring the lantern slides of the cases with you, demonstrate them and give the history and the description. If possible bring the original plate or a copy, and place it in the "plate exhibit" for further study by the members. This is to be a feature of the program and every member is expected to take part. *Send your name to Dr. P. M. Hickey,* Detroit, and state whether you will have one or two cases, so that sufficient time can be allowed on the program for each member.

Select six of your most interesting lantern slides, therapeutic or roentgenographic, to be used in a "Lantern Slide Demonstration" at another hour. These are not to be put in the proceedings, but will surely broaden the views of every man present. These two exhibits alone will make it worth your while to attend the meetings.

Yours very sincerely,

GEORGE E. PFAHLER,

1321 Spruce Street,

Philadelphia, Pa.

The flattering reception which was accorded the first issue of the Quarterly, encourages the Editor to go on with the work, and endeavor to conscientiously promote the interests of the Society.

We are very sorry that illness caused delay in the getting out of the first and second numbers of our publication. However we anticipate that the third number of the Quarterly will be published in two months, so that all the papers which were read at the last meeting of the Society, and such additional matter as may be deemed wise to publish will be in the hands of the readers long before the annual meeting.

The Fifth International Congress of Medical Electrology and Radiology will be held at Barcelona, Spain, from the thirteenth to the eighteenth of September, 1910. For further information inquiries can be directed to Dr. Chas. Lester Leonard, 112 South 20th St., Philadelphia, Pa.

We are very glad to announce that arrangements have been made with Dr. Bowen, Rome, New York, to publish in coming numbers of the Quarterly an index of articles which appear in American Medical Literature on the subject of Roentgenology.

Dr. Bowen has long been interested in devising such an index, and the Editor is very glad to co-operate with him in bringing before the members of the Society this valuable work. Dr. Bowen, while not attempting to abstract the articles, will add such comments as may lend additional interest more than the mere title of the paper would convey.

This index, it would seem, is destined to be of great value in bringing before the members of our Society, what is being done by American Roentgenologists. Its production necessarily entails a vast amount of work, and as members we are under deep obligation to Dr. Bowen for taking up this new work.

Dr. Rollin Stevens, of Detroit, who is busy with the preparations for the coming annual meeting in that city, assures us that the work is progressing favorably, and that everything points to good accommodations for members and exhibitors and to a large and successful meeting. We are glad to publish

a letter from the President, to which special attention is called, inasmuch as valuable suggestions are made for promoting the interest of that meeting.

A feature of the recent meeting at Atlantic City was the interest shown in stereoscopic radiography, and we are glad to announce the publication in the coming number of the Quarterly of a well illustrated article on this subject.

In talking with a recent graduate of an institution, not many miles from our national capital, we noticed the appearance of the hands of the youthful practitioner. The fingers appeared atrophied, and the skin manifested the dryness and roughness so characteristic of an old Roentgen dermatitis.

In conversation with the young man, we learned that he was required by the medical authorities of the Hospital where he served his interneship, to hold the children while they were being rayed. The apparatus in use was an old fashioned static machine, and the exposures covered comparatively a long length of time.

While he was in the institution his hands were the seat of a chronic dermatitis, and we judge that he will never fully recover from its effects.

The requirement on the part of hospital authorities to subject their internes to the continued influence of the ray, is something which should be taken up, and should be absolutely prohibited even if legislation is necessary. The medical authorities of any Hospital certainly have no right to demand of those doing the work in such institutions such sacrifices to their health.

We are glad to think, however, that such requirements are due to the ignorance of the medical men rather than to any intention to subject their assistants to danger.

REVIEWS

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN, BD. XIV, H III.

The Anatomic Basis of the So-called Hilus Shadow on the Roentgenogram, by Eug. Fraenkel and Alex Lorey.

By means of a series of experiments upon the lungs of cadavers and still-born infants the authors demonstrate that the stellate markings at the lung hilus and the radiating markings which extend from the hilus to the periphery of the lung are due not to the bronchial tree but to the pulmonary blood vessels.

The most convincing experiment was upon the lung of a still-born infant. A skiagram of the atelectatic lungs gave a shadow of uniform density showing no structure; a small quantity of air was blown into the bronchi, but not enough to inflate the lungs fully. A skiagram at this stage revealed the outlines of the inflated bronchial tree but not in **white** shadows but in **dark** markings, i. e., the air filled bronchi were more transparent than the surrounding lung tissue. The lung was then completely inflated and upon the resulting negative the **dark** markings of the bronchial tree had disappeared (blotted out by the surrounding air-filled alveoli) and instead new markings appeared which were not dark but light, i. e., of greater density than the rest of the lung. When blood was injected into the pulmonary artery these markings became very prominent, proving them to be produced by the pulmonary blood vessels. The authors therefore urge the adoption of the term "vessel shadows" instead of "bronchial shadows."

Severe Nervous and Psychic Disturbances following Roentgen Burns, by Prof. Dr. Paul Krause.

Krause reports two cases in which severe nervous symptoms and (in one case) severe psychic symptoms followed an X-ray burn. In neither case was there symptomatic evidence of any

organic change in the nervous system and the causal relation of the nervous disturbances to the X-ray burn is not proven. They would probably be classed as traumatic neuroses.

Calcinosis Interstitialis—A New Disease, by Prof. Dr. Paul Krause and Dr. Max Trappe.

This is a second report upon a case which was first described in Vol. XII of the Fortschritte by the same authors as an early stage of Myositis Ossificans Progressiva. But the subsequent history, particularly the regression of the process and the improvement of the symptoms has led the authors to advance the term calcinosis interstitialis progressiva et regressiva for the condition.

The case was that of patient who since 1901 has suffered a stiffening of his musculature especially around hips, knees and arms. The calcification was easily palpated and was demonstrated upon the skiagram. But the ossifying process differs from the well-recognized condition known as myositis ossificans progressiva in the following respects:

(1) The process began in arms and legs. In myositis ossificans the trunk is first affected.

(2) Micro-dactylic, which is so characteristic of myositis ossificans is wanting in this case.

(3) The skin is adherent to the bony masses beneath and seems thickened. Not found in myositis ossificans.

(4) From the skiagram it is apparent that the ossification has taken place in the subcutaneous connective tissue and in the intermuscular fascia, but not in the muscles themselves.

(5) Improvement in the symptoms and partial disappearance of the bony deposit as revealed by subsequent skiagrams indicates retrogression of the process, which never occurs in myositis ossificans.

Ulcus Ventriculi—Diagnosed upon the Skiagram, by Dr. F. Reiche.

A remarkable skiagram is here presented. From the lesser curvature of a greatly dilated stomach there appears a small

projection, pedunculated like a mushroom. The patient presented symptoms of gastric ulcer and died of hemorrhage and a terminal thrombosis of the right jugular vein.

The autopsy elucidated the skiagram. In the lesser curvature there appeared an ulcer about the size of a quarter, which during life, had been evaginated like a glove finger due to high intra-gastric pressure, giving rise to the peculiar projection seen on the X-ray.

A Case of Outward Dislocation of the Astragalus, by Dr. Franz Winkler.

A brief report with skiagrams and favorable outcome.

Failure of Both Lung Apices to Light up Simultaneously, by Dr. A. Bittorf.

The author noticed in making fluoroscopic examinations that the healthy apex becomes visible upon the screen before the diseased one. He refers to the difference in the time required for the two apices to become distinct on the screen and he considers it easier to note this difference in the cases of slight apical involvement than it is to determine an actual difference in density in the very early cases where such increase in density must be very slight. This time difference is best brought out by beginning with a weak light and gradually increasing the current.

Cosmetic Improvement of Roentgen Cicatrices by Fibrolysin Injection and the Quartz Lamp, by Dr. P. F. Becker.

The author obtained a very favorable result in a case of X-ray scar following radiation for lupus by giving 20 injections of fibrolysin and treatments with the Kromayer Quartz lamp, 10 minutes duration, distance 10 c.m., without filter.

Control Scale for the Correct Choice of Tube and Time of Exposure, by Carl Beez.

A small penetrometer is placed upon the plate during exposure which records the penetration of the tube upon the

negative. If the plate is unsatisfactory the cause can be determined by noting the control scale and remedied on the next exposure.

HEFT IV.

Action of X-rays upon the Testicles, by Prof. Dr. M. Simmonds.

The author carried out an exhaustive series of experiments in guinea-pigs and mice.

The practical results of this study are well summed up in the following conclusions:

(1) After sufficient exposure of the testicles, the spermatogenic cells are destroyed but the sustenacular cells, the spermatozoa, the interstitial tissue and the blood vessels are unaffected.

(2) The disturbance in the cells develops only after the lapse of a variable length of time after the exposure (21 days was the shortest time for the appearance of changes in the testicle. Even where the dose was so heavy as to kill the animal in less than three weeks, no changes in the testicle were found).

(3) The first change consists in the cessation of spermatogenesis.

(4) The effect of the exposures is not always parallel to the length of the same. In some animals a twenty minute exposure produced changes which in another 200 minute dose failed to do.

(5) If the animal survives the exposures, a regeneration always occurs and normal spermatogenesis is again established. No matter how severe the exposure there can usually be found some intact spermatogenic cells and these may give rise to the regeneration process.

(6) Parallel with the destruction of the spermatogenic cells there is an over-growth of the interstitial cells and vice versa, as regeneration proceeds, this over-growth again recedes.

(7) The changes produced by the X-ray are not similar to those found in "interstitial orchitis."

(8) In those animals in which the testicles were injured an increase of adipose tissue was later noted.

(9) Changes in the testicles can be produced by very short exposures with heavy milliamperage. With a tube-skin distance of 1½ c. m., slight changes were noted after a three second exposure.

(10) Secondary rays, even after acting for months, do not affect the testicles. Three guinea pigs were exposed for six months to secondary rays at a distance of four feet from the tube without showing any effect on the testicle.

Roentgen Findings in the Skulls of Epileptics, by Prof. Dr. E. Redlich and Dr. A. Schuller.

Skulls of 100 epileptics from Prof. Wagner's clinic were examined by Dr. Holzknecht. The following positive results were obtained:

The first eleven cases were traumatic in origin.

Cases 1, 2, 3 and 4 showed upon the skiagram bone defects in the skull of varying size.

Case 6 showed a splinter of bone 5 mm. long projecting from the inner table, the result of a previous trauma.

Case 7 showed an area of thinning over left temple, while case 8 showed a thickening of the right parietal bone. In two other cases foreign bodies (a bullet and a needle) were found.

Cases of epilepsy with cranial asymmetry and deformity are next reported, including "turm-schadel," microcephalie, pseudo-microcephalie, hydrocephalus; asymmetry of the skull associated with paralyses and epilepsy was shown in one case. Hyperostoses and syphilitic ostitis were found in several cases. An old calcified area of encephalitis and two uncalcified brain tumors are among the cases reported. The one tumor was recognized by its destruction of the sphenoid bone while the other produced areas of absorption of the cranial vault.

The authors conclude with the statement, that every case of epilepsy should be examined by X-rays. While in many no additional information will be gained, yet in others a more accurate conception of the case as well as therapeutic and operative indications may be thus discovered.

Instantaneous X-ray Exposures, by Frederick Dessauer.

Dessauer presents a method of making Roentgenograms in 1/70 to 1/100 of second with an X-ray coil. A single interruption is utilized to flash the tube just for an instant. The primary amperage is not over 50. The coil must be one of great capacity and especially constructed for such work. The method of obtaining the single interruption of the current is similar in principle to a cartridge fuse. The fuse wire is encased in moist clay and when the current is turned on it becomes hot and fuses and at the same time generates steam in the clay, so that a sort of explosion occurs which breaks the current absolutely sharp. It is this "opening-spark" which generates a secondary current of over 200 milliamperes just for an instant. A new fuse is used for each exposure. Light and inexpensive tubes may be used, as there is very little heating. For adult hips and the heavier parts an intensifying screen is necessary. The new type of screen with fine crystals is recommended. The fuses are very cheap and the method makes immobilization of the patient unnecessary, thus saving much time.

"Der Expositionsmesser" (A scale for determining the correct time of Exposure), by Frederick Janus.

An ingenious scale is here presented for determining in a given case and with varying physical factors (tube, milliamperage, etc.) the correct time of exposure necessary to obtain a perfect roentgenogram. The instrument is based upon the following equation:

$$F = \frac{t \times i \times p}{S^2 \times d}$$

$$\text{or } t = \frac{S^2 \times d}{i \times p}$$

Where E = Energy expended upon photographic plate
t = Time of exposure
i = Milliamperage
p = Penetration of tube
s = Focus-plate distance
d = thickness of part to be skiagraphed

Tumor of Base of Brain Diagnosed by X-Ray, by Dr. Hermann Algyogi.

This report adds to the rather limited number of brain tumors diagnosed **directly**, that is where the diagnosis did not depend upon changes in the bones of the skull. The tumor being well calcified cast a heavy shadow in the region of the sella turcica and extended laterally almost to the left mastoid process. Its upper margins were distinct but irregular, below it was continuous with the sella turcica. The shadow on the lateral skiagram was 2--3 cm. high and 6 cm. long. As to the origin of the tumor the author concludes that it sprang from the infundibulum rather than from the hypophysis making the differential upon the following points which he considers characteristic of infundibular tumors.

(1) Suppression of menses.
(2) Absence of acromegaly.
(3) Extreme calcification of the tumor.
(4) Irregular spread of the growth.
(5) Age of patient (37 years).

Infundibular tumors occur mostly in younger individuals and are carcinomatous in nature arising from the lining epithelium of the canal.

Isolated Disease of the Tarsal Scaphoid as an Evidence of Disturbed Development, by Dr. Behn.

Haenisch and Kohler first described this condition in children from five to nine years of age. The etiology is obscure. The child without apparent cause complains of pain in the region of the scaphoid and favors the affected foot. Tenderness is present over the dorsum of the foot and the arch may be flat.

The skiagram shows a scaphoid which is ¼--½ the normal size. It is irregular in contour and very dense, showing no distinction between medulla and cortex and no structure whatever. The lime content is apparently doubled or tripled.

The prognosis is good. Rest and protection decreases the pain and restoration to the normal occurs in 1½ to 2½ years.

The condition has been variously attributed to juvenile osteomalacia, anomaly of development, shrinking of a normally developed bone or trauma to the cartilage previous to its ossification.

Roentgen Therapy with Short Exposures, by Dr. H. E. Schmidt.

Schmidt refers to the report of Albers-Schonberg, in the previous issue, who was able to administer the erythema-dose in 30 seconds, using 30--40 milliamperes in the secondary, Walter 6 tube and 13 cm. focus-skin distance.

Schmidt by using a special tube (Therapie-Central-Rohre) which is blown very thin opposite the target and which has the target placed close to this thin section of the glass wall obtained the erythema effect in 60 seconds. He passed only 1.8 milliamperes through the tube using a coil and a mercury interrupter, thus causing less injury to the tube. The tube was Walter 7, focus-skin distance — 12 cm. He does not advocate such short exposures however, because of the danger of slight overdose.

Isolated Fracture of the Carpal Cuneiform Bone, by Dr. Metzke.

This rare fracture resulted from a fall upon the hand which as a rule causes either a Colles' fracture or a fracture of the scaphoid. The author attributes the rarity of this fracture, first to the protected position of the cuneiform, protected by the pisiform and semi-lunar and, second, to the fact that the cuneiform has no direct connection with the radio-carpal joint.

An Improved Intensifying Screen (Gehler-Folie), by Dr. Alfred Rosler.

In order to overcome the objections of the usual intensifying screen, namely the hazy mottled effects which it produces, the author presents an improved Wolfram screen which is claimed to overcome these objections. The light is a pale violet and much more intense and clear than the screens heretofore used. It is claimed that the time of exposure may be cut down to a fraction of that employed with any given equipment. Thus, a knee which required two minutes exposure, required with this screen only two seconds. As to the life and durability of the screen nothing is known. The author has used one three months without appreciable deterioration. "Gehler-Folie" is the trade name of the screen.

A Case of Unusually Large Exostosis of Os Calcis, by Dr. Janowsky.

The report of this case emphasizes the very important fact that os calcis spurs are usually painless until a dropping of the arch causes pressure upon them. In this case the patient complained of pain in the right heel which foot also exhibited slight flatfoot. The skiagram showed a fairly large exostosis from the under surface of the os calcis. An examination of the other (left) heel showed an unusually large exostosis almost an inch long which was causing no symptoms whatever.

SIDNEY LANGE, M. D.

BOOK REVIEWS.

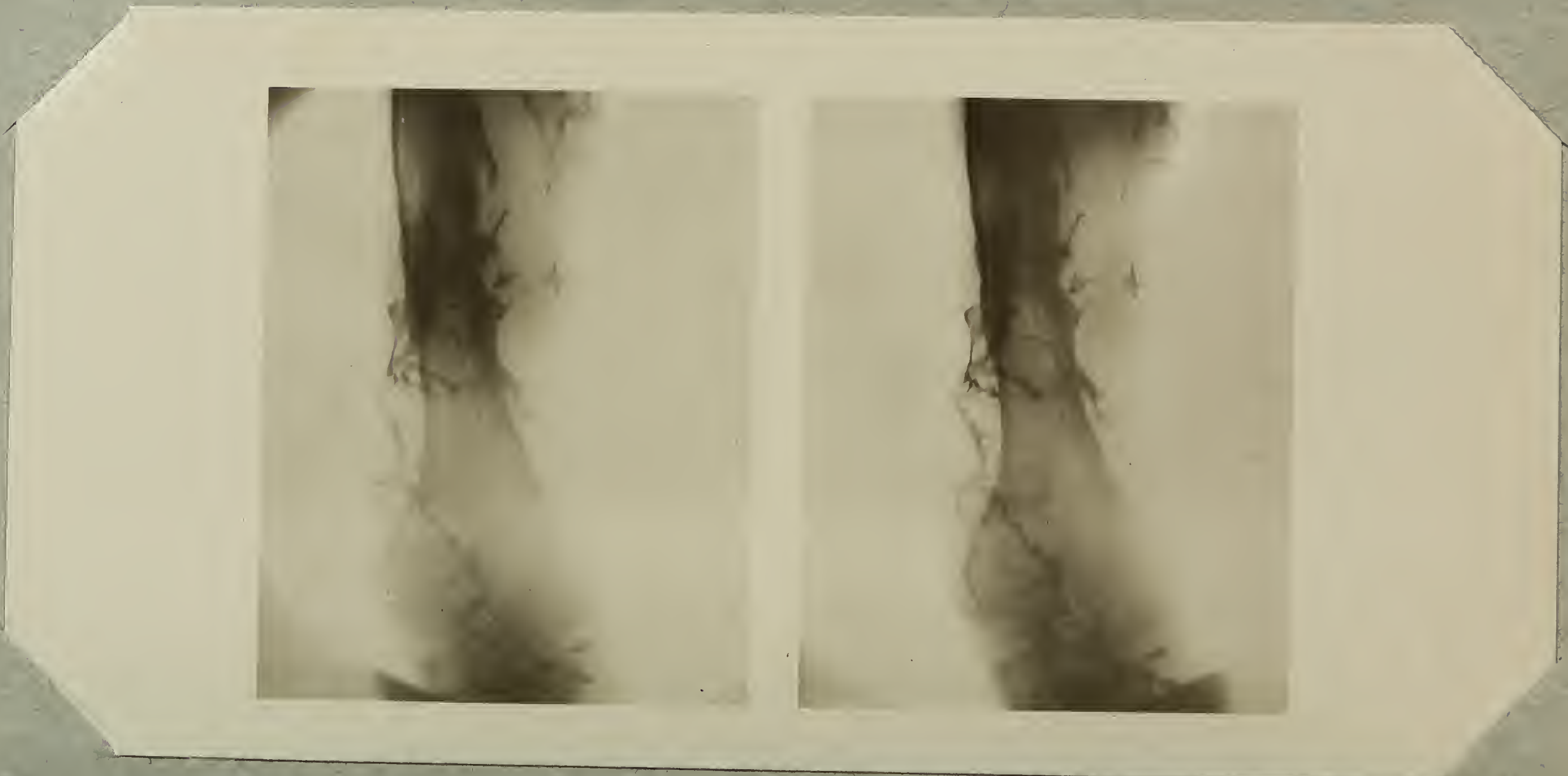
Through the courtesy of the J. B. Lippincott Co., we are in receipt of a volume by Dr. Thomas Morgan Rotch, entitled, Living Anatomy and Pathology, the Diagnosis of Diseases in Early Life by the Roentgen Method.

This is a large, handsome volume, very amply illustrated, most of the Roentgenograms being made by Dr. Ariel George. Dr. Percy Brown has contributed several plates on the Roentgenology of the gastro-intestinal tract in children.

This work of Dr. Rotch's takes up the anatomy and pathology of infants, from a medical and surgical standpoint, as elucidated by the Roentgen Ray. An immense amount of work has been done, and the plates which are shown are of very high order.

The reproductions have been carefully made, and form a very distinct addition to American literature in this branch. The text has been carefully prepared, and serves to well elucidate the Roentgenograms which are presented.

This volume should be in the library of every Roentgenologist, as it constitutes a valuable contribution to American Roentgenology.



Stereo I. Sinuses Injected With Bismuth Paste

The American Quarterly of Roentgenology

Edited by P. M. Hickey, M. D.

Vol. II SEPTEMBER, 1910 No. 3

STEREOSCOPIC RADIOGRAPHY AS DIAGNOSTIC AID IN PULMONARY TUBERCULOSIS.

BY EMIL G. BECK, M. D.
Surgeon to the North Chicago Hospital, Chicago, Ill.

For nearly thirteen years radiography of the chest has been employed as a diagnostic aid in pulmonary tuberculosis, and its utility highly recommended by the foremost clinicians in the world, but, strange to say, it has not yet become very popular.

Authorities, such as Rieder,[1] Albers Schoenberg,[2] Kyritz,[3] Krause,[4] Wolff,[5] Pfahler,[6] Levy Dorn & Cornet,[7] Holland,[8] Wenckebach,[9] Arnsperger,[10] have furnished splendid illustrations of its diagnostic value, so that we wonder why the medical profession is so sluggish in accepting a diagnostic aid recommended by such reliable men.

Two obstacles seem to impede the way to its extensive use: **First, the cost; second, the lack of facilities** for obtaining perfect radiographs by the general practitioner.

NOTE—The explanation of the inserted Stereoscopic Radiographs will be found on the back of each insert.

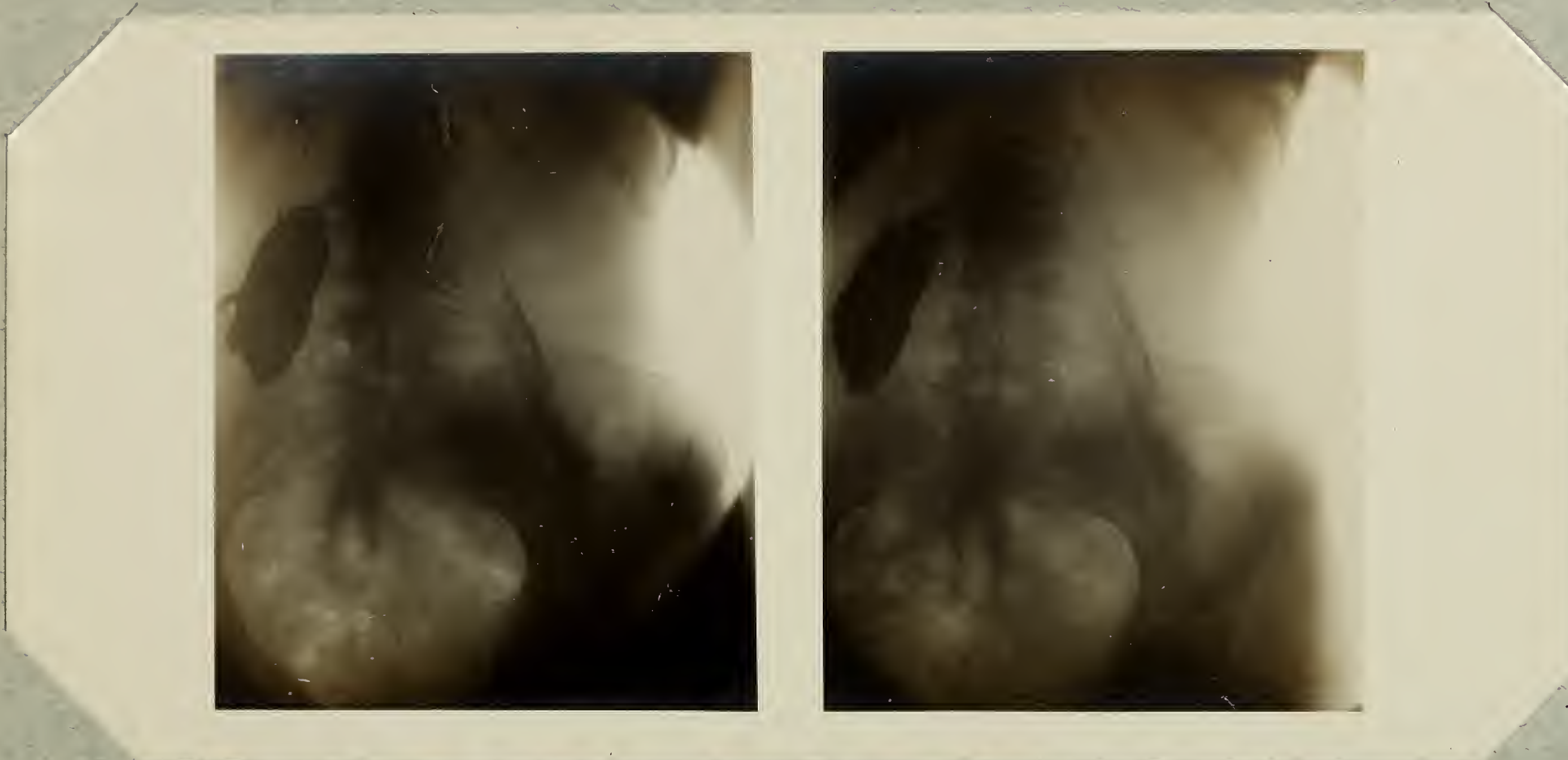
Even perfect radiographs are not appreciated by all, because it requires a certain amount of practice to make correct interpretation, and to those who are not familiar with this work the radiographer's interpretation is not always convincing. They suspect that the enthusiastic radiographer is apt to make false deductions, being influenced and misled by what he wishes to find.

To a certain extent, the general practitioner is justified in his conservatism. He does not wish to employ a method, the advantages of which he himself cannot see. Even experts confess their inability to explain all radiographic shadows, the most perfect plates often displaying mysterious findings.

Therefore, we cannot expect the chest radiograph to become popular as a diagnostic aid in pulmonary tuberculosis until we furnish the practitioner with a photographic plate which he himself can interpret.

Stereoscopic radiography appeals to me as the most promising possibility in attaining this end. I desire to report my experience with this advanced method and state beforehand that its advantages are so pronounced and so easily demonstrated that I expect to arouse an interest in those who still regard radiography of the chest of doubtful diagnostic value. One cannot, however, be too emphatic in stating that the radiogram, no matter how perfect it may be, can be regarded **only as a diagnostic aid** to the other methods of examination, and not as their substitute. He who will diagnosticate with the X-ray alone will make many blunders, and soon learn that he must employ at the same time the other well-tested methods of examination and then use the radiogram to confirm his diagnosis.

In the fall of 1907 I began to employ stereoscopic radiographs for practical purposes, namely: To trace fistulous tracts and empyema (Beck)[11] by means of the bismuth paste injections. **(Stereo 1 and 2.)** While we have also employed it in the diagnosis of other diseases of the chest (Beck),[12] a special study of its value in the diagnosis of pulmonary tuberculosis has been carried on by me for the past two years.



STEREO II. SPONDYLITIS WITH BILATERAL PSOAS ABCESSES CAUSING SINUSES

A series of seventy-five cases, from the practices of my brothers, Drs. Carl and Joseph Beck, as well as my own, including some from the public sanitarium for the tuberculous at Dunning, Illinois (a State institution which takes care of about 450 consumptives in advanced stages), forms the basis of this report.

The method, as we know, consists of the taking of two separate skiagraphs of the same region of the body from different angles, without changing the position of the parts during the two exposures.

After the plates are developed they are placed side by side and viewed by means of a pair of prisms, and thus the stereoscopic view is obtained.

Stereoscopic radiography has been employed in this country (Kassabian)[13] and abroad since the discovery of the X-ray, but its practical diagnostic value in pulmonary tuberculosis has not been sufficiently brought to the attention of the medical profession. The work of Professor Wenckebach at the University of Gröningen, and his excellent illustrations, and that of Alban Koehler, have stimulated me to perfect this method and to further its practical application. After one has employed this stereoscopic method of radiography he will no longer be satisfied with the single plates, and realize under what disadvantage he was working when using non-stereoscopic plates. One obtains an entirely new conception of this science and recalls the numerous errors of the past which resulted from false interpretation of single radiographs.

NON-STEREOSCOPIC RADIOGRAPHY.

The single radiograph is merely a shadow picture of the objects placed between the anode of the X-ray tube and the sensitive plate. The shadows thus produced appear in one plane, so that one is unable to judge whether the object producing them is located on the anterior or posterior part of the chest.

Overlapping shadows, produced by two or more objects, which happen to be in line with the source of the rays, will appear as one single, although somewhat intensified, shadow.

Moreover, the size of the object is distorted, depending altogether upon the distance of the same from the sensitive plate. For instance: A lesion the size of a hazel-nut, located on the posterior part of the lung, will give a distinct shadow not much larger than its actual size, while the same lesion, located on the anterior part of the lung, will produce a shadow twice its actual size, but much less distinct in outline.

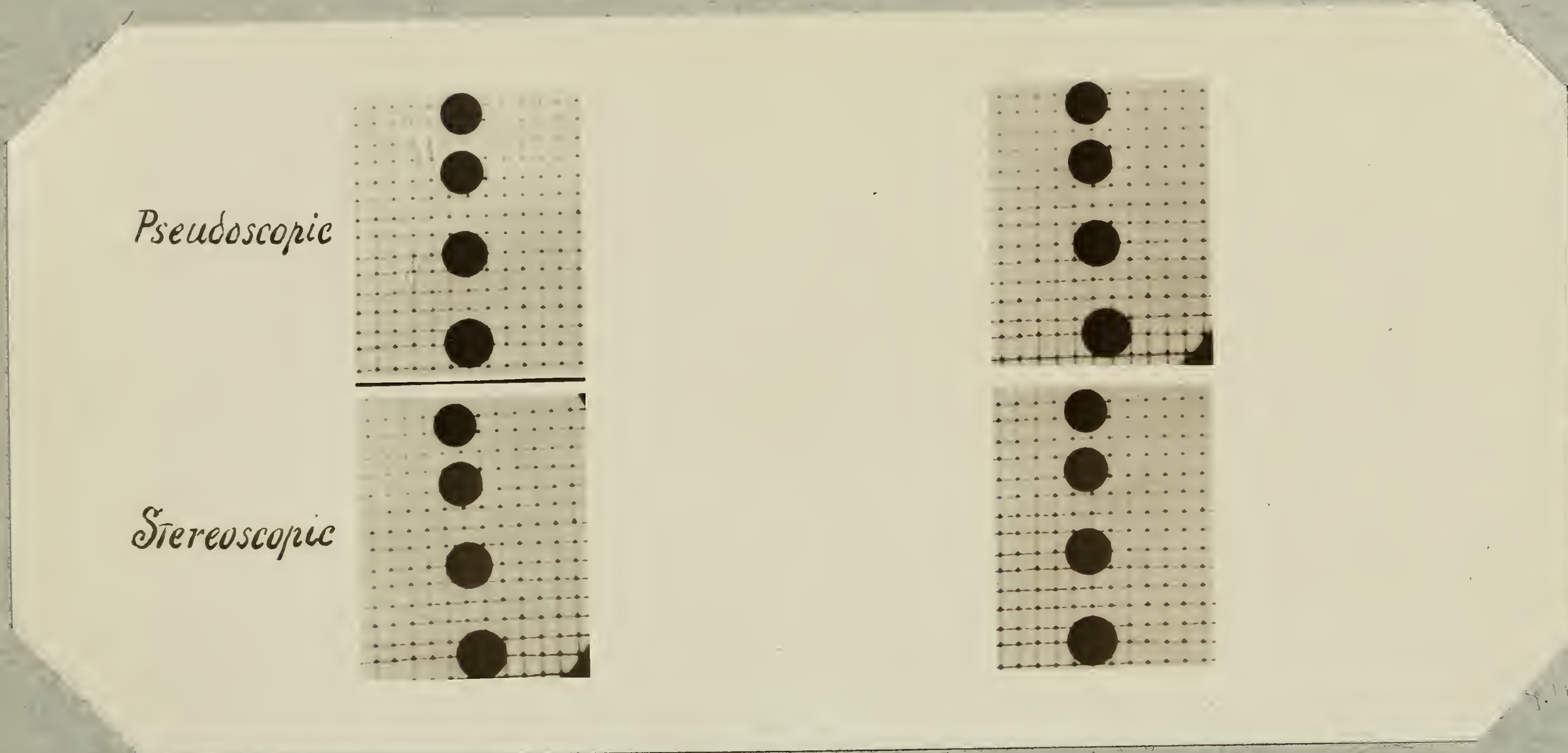
A convincing illustration of this fact is seen when the stereoscopic card (Stereo 3) is viewed. It represents a radiograph of four coins (American half dollars, which, of course, are all the same size) placed side by side on a wire screen, each coin, however, being placed at a different level from this screen, supported at the different heights by various thicknesses of cotton. The first coin is directly on the wire screen, the second is one inch higher, the third two inches, and the fourth is three inches above the screen. (The upper set is transposed to show a pseudoscopic view, referred to later.)

In the single plate the difference in the sizes of the coins due to spreading of the shadow, is quite apparent, and the difference of shadow-intensity quite perceptible, and all coins appear to lie directly on the screen.

In viewing the lower set of coins by means of the stereoscope, all four coins appear of equal size; the difference in the intensity of the shadows is not nearly so marked, and their relative distance from the screen quite distinct. (See lower set of coins marked "Stereoscopic.")

This holds good only when the plates are viewed in the same way in which they were taken, i. e., the coins to appear between the wire screen and the observer. By transposing the plates, that is, by shifting the right plate to the left and the left plate to the right, without turning them, the difference in the size will appear even more exaggerated. (See upper set of coins marked "Pseudoscopic" on card 2.)

Another disadvantage of the single X-ray plate is the fact that the translucent lung is obscured by the shadow of the



Stereo III. Coin Experiment

(Demonstrating the fact that by the use of stereoscopic radiographs we obtain a true optical view of the objects)

heart, the ribs, and the overlapping clavicles. It is unusual to obtain a clear apex, since the forward curve of the first rib and the overlapping clavicle often obscure the entire space of the apex.

How is one to make correct deductions when such physical obstacles are to be overcome?

STEREOSCOPIC RADIOGRAPH.

The stereo-radiograph overcomes many of these difficulties. The fusion of the two pictures into one by means of the prism glasses builds up a translucent body resembling a glass model, in which all structures can be plainly distinguished. **The radiograph really ceases to be a shadow.** The plastic effect produces clearer outlines of structures, and all parts stand out distinctly, so that the distance between them can be estimated.

The bones become more translucent and the convexity or concavity is easily discerned. The overlapping of the clavicle and the first rib is of little consequence since the translucency of the bones permits inspection of the hollow space between them.

Lesions within the chest are thus easily located and their density and contour determined without difficulty. The distortion of size of structures, the fault of single radiographs, is corrected in the stereo-radiograph, because it produces a true optical view. Another advantage is the possibility of inspecting the chest antero-posteriorly, as well as postero-anteriorly, by simply transposing the plates.

In the antero-posterior view one can note distinctly that the spinal column and scapulae are behind the heart, and that the ribs curve forward, while the clavicle appears to stand out about one inch anterior to the chest wall. By transposing the plates the entire picture is reversed as though the subject were viewed through the back.

The correct way of inspecting the plates, however, is to view them in the same relation in which they were taken; in other words, if a chest has been taken dorso-ventrally, it should be viewed dorso-ventrally. The reason for this is explained by the coin experiment.

A practical illustration by means of the stereo-radiograph is more convincing than a mere description, or even by the reproduction on small cards, where a great deal of the detail is lost. The interpretation of single plates requires a great deal of experience, but the stereoscopic examination is so convincing that an intelligent layman may understand it.

The following points will be illustrated:

1. That the early signs of infiltration of the lung may be shown, where the diagnosis by other methods is doubtful.

2. That when diagnosis is certain, the extent of the tuberculous disease and formation of cavities may be demonstrated.

3. That an active tuberculous process may be differentiated from a latent one by means of the radiograms.

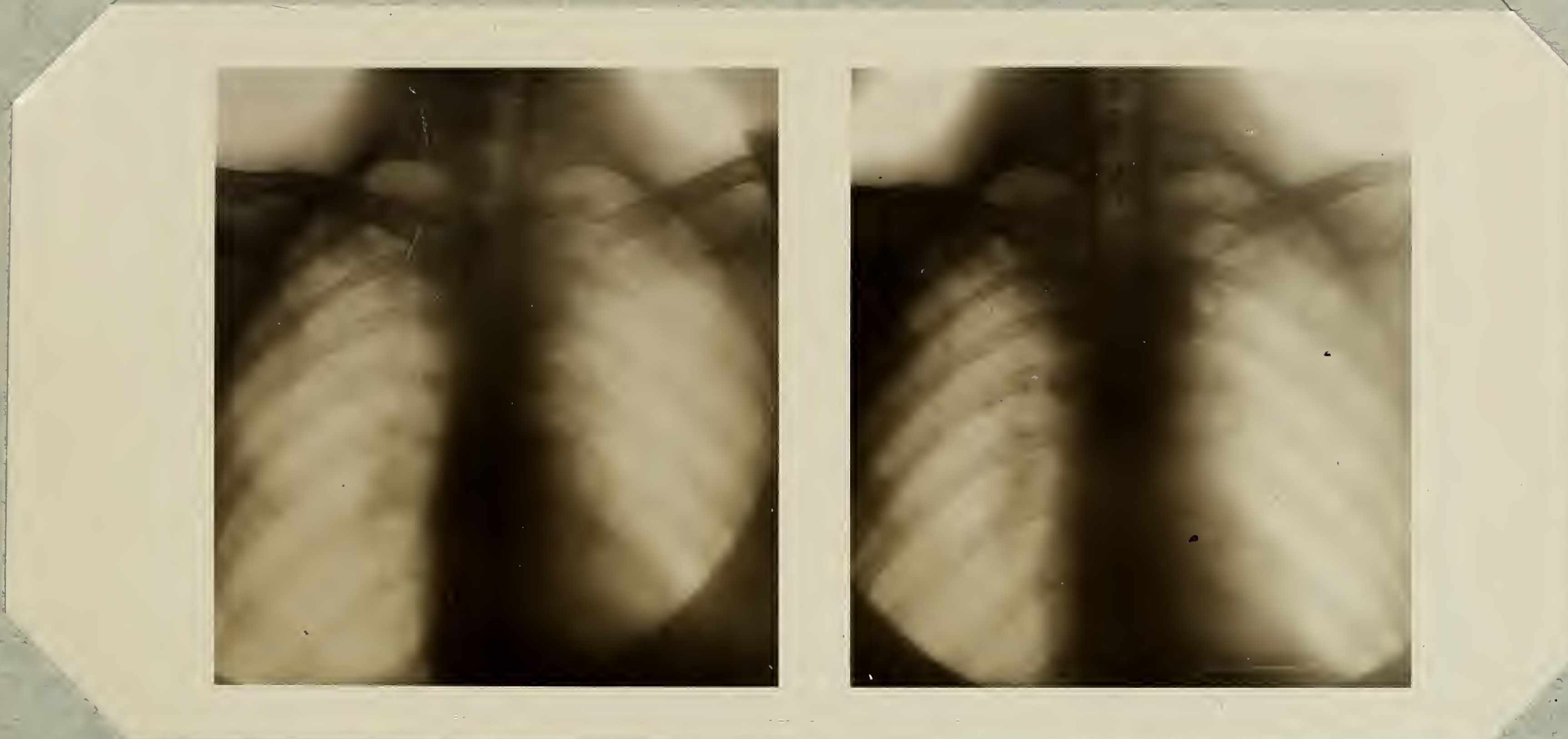
4. That the bronchial tree produces shadows which must not be mistaken for tuberculous foci or peribronchial glands.

INCIPIENT TUBERCULOSIS.

Stereo 4 illustrates an infiltration of both apices in a case of incipient tuberculosis.

A. V., twenty-six years old, had never suffered with any affection of the lung until May, 1909, when he noticed a daily rise of his temperature, and loss of weight. In July, 1909, he requested an examination because of loss of strength and fifteen pounds in weight. Aside from the positive Pirquet test and loss of weight, with daily elevation of temperature to 99.6°, we could find no symptoms indicating tuberculosis. The stereo-radiograph, however, clearly showed an infiltration in both apices (**Stereo 3**). The patient was kept in Chicago for two weeks for observation, during which time he developed a slight cough and further loss in weight, his temperature rising to 100° every evening. He was advised to go to Colorado, where our diagnosis was confirmed and proper treatment instituted.

In this case the radiograph was the deciding factor in the early recognition of the pulmonary disease. The cloudiness in the apex indicated that the disease was not sufficiently advanced to produce any signs which could have been discovered



Stereo IV. Incipient Tuberculosis

by auscultation or percussion, but in connection with a positive "Von Pirquet" test, fever and loss of weight, one could hardly hesitate to pronounce it a case of incipient tuberculosis.

In our series we have met with a number of cases of this type, and, as a rule, the subsequent history proved our diagnosis to be correct. Again, in a number of cases where the disease was suspected, the radiographs proved the suspicion unfounded.

Before illustrating the difference between the active and latent tuberculosis, I will try to account for the frequency of the shadows in all chest radiographs.

It is known that mottled shadows and strands near the root are found in radiographs taken of perfectly healthy persons, when tuberculosis is not even suspected. In fact, perfectly clear chests are exceptional. At the root there are nearly always a number of spots, three or four on each side, which are usually supposed to be cicatrices or calcified peribronchial glands. From the root we often find a number of strands running upward toward the apex, and some downward, especially on the right side. The latter have been called "Lymphstrange" by Germans and are sometimes taken to be cicatrices from healed-out tuberculous processes. In taking radiographs we not infrequently find large areas of the lung studded with small star-like spots, in perfectly healthy persons, with no symptoms to account for the same.

To illustrate this we have taken chest stereo-radiographs of ten perfectly healthy nurses, ranging from twenty to forty years of age, and have found in only one what we could pronounce a clear lung. The other nine showed the signs referred to.

To a novice these findings must prove very confusing. How is he to judge whether a patient has tuberculosis, when nearly all chest pictures show similar spots and streaks?

The shadows and strands usually running from the root of the lung were always a puzzle to me until their real significance was revealed by the following study. Their origin has been a disputed subject by many observers, the opinions vary-

ing so much that it was difficult to know to which theory to lean. Some claim that these root shadows are due to the folds of the pleura (Halls-Dally), other authors claim that they are the shadows of blood vessels or lymph channels. An interesting and most reliable study was published by De la Camp[14] in 1904, and his conclusions, that the root shadow ("Hiluszeichnung") is produced by the bronchial system still holds its place among most of the radiologists.

The similarity in the topography of these streaks to the branches of the bronchial tree was so suggestive that I decided to study the anatomical distribution of the bronchi in order to ascertain if these streaks were really the shadows of the bronchi. For this purpose I injected the bronchial tract of a fresh cadaver with 200 grams of liquefied bismuth-vaselin paste, and took a stereoscopic radiograph of this chest **(Stereo 5)**. The picture thus obtained furnished a true reproduction of the bronchial tree in situ, with plastic effect, clearly showing the relations of all the structures within the chest.

The division of the trachea in this case took place opposite the sixth dorsal vertebra. It is generally assumed that the right bronchus is a continuation of the trachea. Practically, this is the case, but if one wishes to be exact, our radiograph shows that this statement must be modified. Exact measurements in this case show that the right bronchus deviates seventeen degrees and the left forty degrees from the line of the trachea. These angles may vary in different subjects. A repetition of this means of measurement in a large series of cases would be a reliable method of determining the question.

The number of subdivisions in the bronchi are not uniform in all parts (varying from six to ten), the bronchi running toward the lower lobes having more subdivisions. The bronchioles appear somewhat beaded, due, probably, to over-distention by the paste. Even in the smallest bronchioles, and in a few places the air vesicles have been injected. The latter resemble small bunches of cauliflower, placed at the ends of the bronchioles.

Stereo V. Bronchial Tree Injected With Bismuth Paste

To explain the displacement of the air within the bronchi we can only assume that it has been forced into the partially collapsed air vesicles.

Comparing the distribution of branches of this bronchial tree with the perplexing streak shadows of our chest radiographs, one is struck by the resemblance of their course, and, in fact, accurate measurements demonstrate that these streaks are undoubtedly the shadows of our bronchial tree. We find, for instance, in practically all cases where this bronchial shadow is present, a triangle, the base of which is formed by the lower border of the fourth rib, the apex pointing to the fifth rib, just about two inches from the border of the spinal column. Anyone may convince himself of this fact by looking over the chest plates taken in the past, or by looking through the atlas, or past numbers of journals which contain hundreds of such chest radiographs. There are other landmarks which correspond to the branches of the bronchi, so that the correctness of the origin of these shadows cannot be doubted, for instance:

Close examination of this radiograph of the bronchial tree reveals that there is not a trace of the spots or strands usually present in other chest pictures taken of the living. The explanation is very simple when one reflects that the opacity of the material injected into the bronchi covers up all traces of these strands. This further corroborates my assertion that these strands represent the heavy branches of the bronchial tree.

Experiments, in 1905, by Dr. Hickey,[15] of Detroit, indicated that these shadows are due to pulmonary vessels, but the fact that these shadows are obliterated when the bronchi are injected, and, furthermore, that the parallel lines of the bronchial tubes are distinct, favor the De la Camp theory, namely, that the bronchi are the factors causing these hilus streaks.

The question now arises: Which constituent of the bronchi produces the shadows? Is it the cartilage, an inflammatory process, or peribronchial glands? No doubt all these factors may contribute to the density of the bronchial wall, but I am

convinced that the sclerotic change in the tissue is the chief factor, because I find these bronchial shadows very much marked in old people, and not marked in children. I have excluded the possibility that the dust in the bronchial tubes could be the important factor by taking radiographs of coal shovelers just as they had finished a day's work. Their lungs did not show these bronchial shadows very clearly, probably because they were young individuals. This question is, however, not definitely settled. It will require an extensive study of a series of post mortem cases, with microscopical examination of the bronchial walls, in order to determine which of these factors are most prominent in producing these bronchial streaks.

We believe thus to have helped in clearing the perplexity of interpreting the various chest shadows in the radiograph, and thus the most confusing obstacle is removed and we can proceed to illustrate the diagnostic possibility of the stereo-radiograph in differentiating an active tuberculosis from a post tuberculous lung.

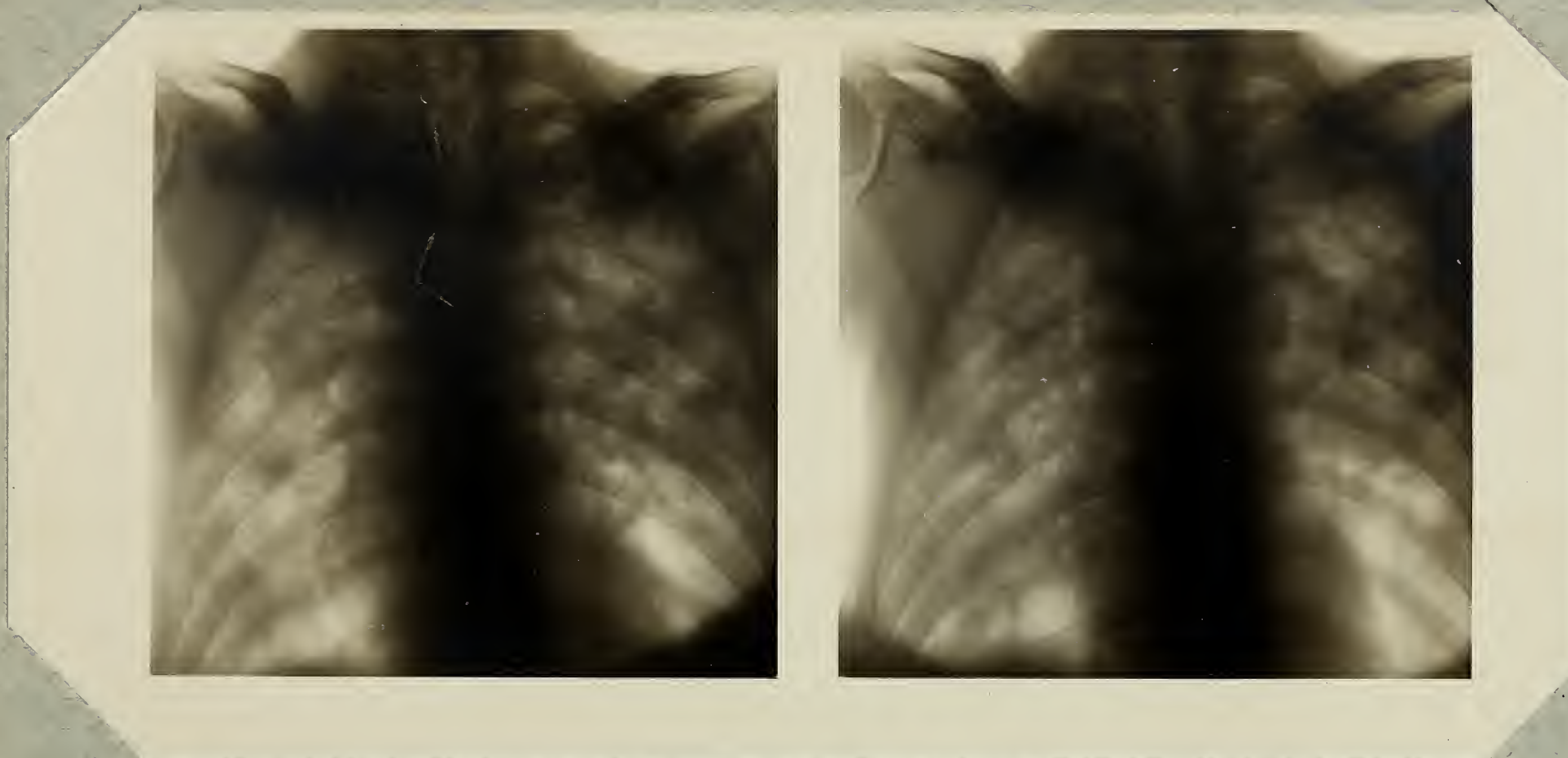
The distinguishing feature between the active and latent tuberculous process is this: In the active state the foci of infection are shown by shadow-spots, each surrounded by a halo, which merge into other similar foci, so that frequently a large portion of the lung appears solidified. This halo, no doubt, represents an area of infiltration about a tuberculous focus.

Quite different are the findings in the latent or post tubercular state, where, by physical examination, the resonance of the lung is perfect and no other symptoms of tuberculosis are demonstrated. Here we discern the cicatrices remaining after the disease has healed, standing out clearly, resembling spider-like figures imbedded in entirely clear lung tissue.

The distinction between these two conditions is illustrated by stereo-radiographs Nos. 5 and 6.

ACTIVE TUBERCULOSIS.

Stereo 6 represents the active disease. The patient, a young man, twenty-six, an inmate of the Tuberculosis Institute at



Stereo VI. Active Tuberculosis

Dunning, Illinois, is in the advanced stages of tuberculosis, as may be judged from the radiograph alone. Viewing the single plate, it appears that nearly the entire lung is solidified, the shadows covering nearly the entire area of the lungs. Viewing, however, the stereoscopic pair by means of the prisms, this illusion is dispelled. We obtain a correct optical view. The shadows, which, in the single plate, were spread in one plane, on the plate, are now shifted in the various depths of the chest, so that they appear like solid bodies imbedded in clear lung tissue, and the consolidation does not appear nearly so extensive.

POST-TUBERCULOUS LUNG.

Stereo 7 illustrates the post-tubercular state. A young man, twenty-four years, who for sixteen years had tuberculous sinuses of his right knee, applied to me for treatment. The affected limb was six inches shorter than the other, due to atrophy. Regarding the limb as useless, I advised amputation above the knee, which I performed and an artificial limb was substituted. This patient gave a history of a prolonged sickness in his childhood, which suggested to me that he might at one time have been also afflicted with pulmonary tuberculosis. At present there are absolutely no symptoms suggesting this disease. His lung is perfectly resonant; he has not coughed for years, nor has he been subject to "colds."

To satisfy my curiosity we took a set of stereoscopic chest radiographs, which proved quite clearly the healed-out tuberculous process, **Stereo 7** showing the upper part of the right lung, studded with well defined fibrous scars, surrounded by translucent lung.

In **advanced cases** the stereo-radiograph furnishes great assistance in the prognosis. It enables us to recognize cavities in the lung, and plainly shows the extent of the disease.

TUBERCULOUS CAVITY.

That tuberculous cavities may be better distinguished by stereoscopic radiographs is shown in **Stereo 8.** Here we find a cavity in the right lung with well defined walls. The cavity was diagnosed during life-time, and also found at the post-

mortem. One is not apt to mistake a pneumothorax for a tuberculous cavity. The characteristic infiltrated wall so plainly shown in the tuberculous cavity is absent in pneumothorax (Fig. 2). Moreover, we usually find the pneumothorax adjacent to the chest wall, while the cavities are found mostly in the center of the lung or near the apex.

With these illustrations I trust to have helped in establishing the use of the stereo-radiograph as a diagnostic aid in pulmonary tuberculosis and hope that the students of tuberculosis will interest themselves in this most valuable aid and put it into practice.

What are the objections to the stereo-radiograph? The principal one is the additional cost. We realize that in order to make a method popular, it must be simple and not too expensive. I regret that this method does not fill entirely these two requirements, but it has offered us such advantages that we have entirely lost sight of its cost, and now employ it almost exclusively, not only in the chest, but in radiography of all parts of the body including the head.

In institutions in which a radiographer is employed the expenditure is reduced to a minimum, and in private practice the expense of a radiograph should not stand in the way of assisting the physician to make or to verify a diagnosis of such vast importance.

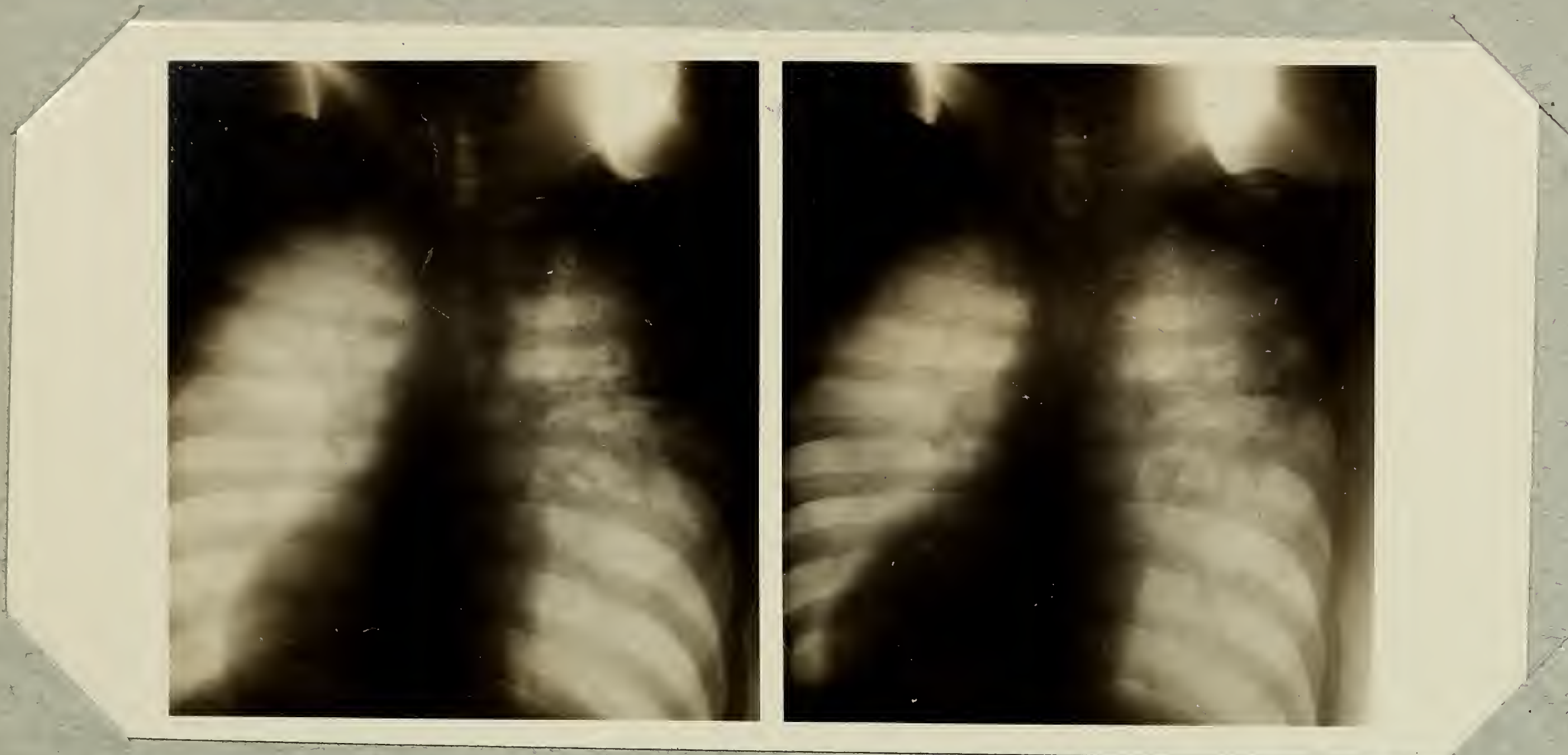
2632 Lake View Avenue, Chicago.

LITERATURE.

[1] Rieder—Die frühzeitige Erkennung der Lungentuberkulose durch das radiologische Verfahren. "Deutsches Archiv fur klin. Medicin. 1908, Bd. 95, pg. 62."

[2] Albers Schoenberg—Die Lungenspitzentuberkulose im Roentgenbilde. "Deutsche med. Wochenschrift. 1908, No. 20."

[3] Kyritz—Lungenspitzen und Bronchialdrusentuberkulose im Roentgenbilde. "Brauers Beiträge nur Klinik der Tuberkulose, Bd. X, 2, S. 129."



Stereo VII. Healed Tuberculosis

[4]Krause—Uber den Wert der Roentgendiagnostik der Frühtuberkulose der Lunge. "Med. Klinik. 1908. p. 1093."

[5]Wolff, M.—Roentgenuntersuchungen und klinische Frühdiagnose der Lungentuberkulose. "Fortschritte auf dem Gebiete der Roentgenstrahlen. Bd. 13, p. 65."

[6]Pfahler—Roentgendiagnosis of Diseases of the Lungs. "Journal of the Amer. Med. Assoc., Vol. 45, 46."

[7]Levy-Dorn und Cornet—Das Roentgenbild des normalen Thorax mit Rücksicht auf die Diagnose der Phthisis inzipiens. "Berl. klin. Wochenschr., 1908, Nr. 21."

[8]Holland—The X-ray Examination of the Thorax. "Arch. of the Roentgen Ray, Dec., 1909."

[9]Wenckebach—"Arch. of the Roentgen Ray, Vol. XIII., Dec., 1908, p. 172."

[10]Arnsperger—(a) Die Roentgenuntersuchung der Brustorgane, 1909. (b) Zur Frühdiagnose der Lungentuberkulose. "Münch. Med. Wochenschr., 1907."

[11]Beck, Emil—Surgical Treatment of Tuberculous Sinuses and Empyema and Their Prevention. "Transac. of Sixth Internat. Congress on Tuberculosis."

[12]Beck, Emil—Surgical Treatment of Tuberculous Pleurisy, Lung Abscess and Empyema. "Journal Amer. Med. Assoc., Dec. 18, 1909."

[13]Kassabian—Transactions of the American Roentgen Ray Society, 1905, p. 166.

[14]De la Camp—Das anatomische Substrat der sogenannten Heiluszeichnung im Roentgenbilde. "Physik Med. Monatsschrift, 1904."

[15]Hickey—Transactions of the Roentgen Society, 1905.

ROENTGEN-RAY DIAGNOSIS OF DISEASES OF BONES.*

BY WILLIAM H. DIEFENBACH, M. D.

One of the developments in Roentgen-ray diagnosis which is of the utmost importance and the diffusion of which is essential for further progress in medicine, consists in the recognition and differentiation of diseases of the osseous system.

Fractures, injuries and abnormalities, acquired and congenital, have heretofore received due consideration and the Roentgen literature on these subjects is voluminous and satisfying; the subject of diseases of bone, however, still offers fertile soil for further study.

The object of this paper is not to cover the entire subject by reference to or including the work of others; it will consist of an exhibit and discussion of lantern-slides collected by the writer during the past decade and upon which discussion and criticism is invited from the members for mutual profit.

Rachitis, Barlow's disease, Acromegaly, Cretinism and Myxedema will not be discussed in this article as the usual methods of diagnosis are quite satisfactory in above lesions and their additional presentation would extend the scope of this paper so as to make it too lengthy.

The lesions which will be shown in sequence are as follows: Periostitis, enchondroma, ostitis, osteo-myelitis, osteo-malacia, ossium fragilitas, bone-cysts, osteoma, including bone changes in early arthritis deformans, osteo-sarcoma and lastly tubercular, syphilitic and gonorrhoeal bone lesions.

The first slide represents a common periosteal lesion found after typhoid fever—bulging out of the periosteal shadow and practically no involvement of the bone itself. Simple periostitis is difficult to diagnose until the inflammatory process

*Read before the American Roentgen-Ray Society, Atlantic City, N. J., September 23rd, 1909.

Fig. 9—Osteoma, verified microscopically.

has produced some swelling and deposits of some size are noted. This requires at least one week when circumscribed areas of darkness co-incident with exudation and sclerosis appear. Suppuration and necrosis are readily distinguished when supervening upon simple periostitis. In these cases there are circumscribed areas of darkness and mottling which may eventually extend over a large area.

Dental injuries frequently produce maxillary periostitis and the Roentgen-ray will readily differentiate this lesion from neuralgia and neuritis at this and other locations. A number of cases of so-called facial or maxillary neuralgia were, after Roentgen examination, found to be due to periosteal inflammation or abnormalities of the tegumentary system and not due to nerve lesions.

In periostitis gummosa infiltration of the gummatous deposits causes a swelling of the periosteum and of the Haversian canals; the nutrient marrow channels enlarge and become filled with gummatous material. This swelling of the periosteum and the invasion of bone in secondary syphilis produces a characteristic bulging; a bow-like curve is especially noted at the tibial upper and middle third and has long been a classic diagnostic feature of this disease. These lesions will be shown under syphilitic bone lesions.

ENCHONDROMA OR CHONDROMA.

Enchondroma is found most frequently in the metacarpal and phalangeal bones but may also occur in other long bones such as the humerus, ulna, radius and femur. Enchondromata of the ribs and other bones of the skeleton have also been noted. These cartilaginous tumors appear homogenous (similar to sarcoma); they have, however, islands of bone interwoven with the homogenous mass, giving it a net-like appearance. The cartilaginous portions produce a lighter shadow than the bone tissue and the latter is gradually destroyed by the chondroma. The shaft tissues are invaded as in osteo-sarcoma, from which this lesion must be differentiated. Chondromata do not affect the periosteum which is an important diagnostic point. When these chondromata

calcify, a mixed tumor, osteo-chondroma is formed. Sarcomatous degeneration may also supervene and chondrosarcoma be the result.

OSTITIS.

Ostitis is usually associated with periostitis and may follow fractures, severe injuries or infectious processes. The slide showing incomplete fracture of the tibia shows an area of ostitis followed by osteo-myelitis. In chronic cases sclerosis of bone follows and the whole of the affected bone shows an almost uniform dark area with some irregularity in contour at different points on the periphery. In aggravated cases ostitis deformans may supervene with deformity and irregularity of bone. The tibia is the most frequent site of this lesion which may also involve the humerus, clavicle and femur.

OSTEO-MYELITIS.

Osteo-myelitis is diagnosed by the Roentgen-ray when distinct pathological changes in bone have occurred. This may require some time; the older the lesion the more easy is the Roentgen diagnosis. This affection is usually due to infection but often follows extension of a periostitis and ostitis. It is confined to bone and does not invade the soft tissues excepting through sinus formation or breaking down of tissues through continuity of inflammation.

Osteo-myelitis presents four points for Roentgen diagnosis:

1. Ossifying periostitis and ostitis.
2. Sclerotic changes.
3. Abscesses and cavities.
4. Sequestra of bone.

The shaft of the distal end of bones is the favorite site. There are found centrally located, circumscribed, clear spaces (cavities) with surrounding darkened areas (due to ostitis) and coincident periosteal enlargement, sometimes destruction and darkened shadows of same. Sequestra of bone when present can be readily located and abscess and sinus formation

Fig. 10—Bone cysts, multiple.

determined—the latter by means of the Bismuth injection method. In chronic cases of osteo-myelitis the myelogenous portion of bone shows a darker and enlarged shadow owing to sclerosis.

Osteo-myelitis is distinguished from sarcoma from the fact that the latter invades surrounding soft tissue while the former is confined to bone. Osteo-myelitis is a **destructive** process; sarcoma a proliferating process. Sarcoma prefers the extreme ends of the shafts of bone and commences as a subperiosteal growth, excepting in the giant cell variety which usually starts in the medulla. In advanced cases of osteo-myelitis, the diagnosis is very easy as necrosis, caries, cavities and sequestra of bone can be readily noted.

OSTEO-MALACIA.

Osteo-malacia is rendered easy of diagnosis by means of the Roentgen-ray. It may be suspected in cases of spontaneous fractures (syphilis and osteoporosis must be excluded) but the characteristic Roentgenogram will clear away all doubt. We find here a **shell-like appearance** of bone—due to lack of calcium salts, and an increased medullary shadow. These characteristic shadows are found in no other lesion and the study of a few plates and points will impress the picture of the disease upon the diagnostician so that it will be readily identified. Osteo-myelitis may be confused with osteo-malacia but in the former the cavities, necrosis of bone and sclerotic areas of bone should clear away all doubt.

Osteoporosis, which frequently follows locomotor ataxia, shows destruction of osteo-blasts and like osteo-malacia is often followed by spontaneous fracture—it is usually confined to small areas, does not present the enlarged medullary shadow nor the shell-like envelope of bone.

FRAGILITAS OSSIUM.

Fragilitas ossium—this condition is closely allied to osteoporosis. The medullary tissue loses its cells and fatty or gelatinous change takes place causing an increase in the

medullary space and rendering the bone subject to spontaneous fracture. Calcium salt deficiency is also noted and the bone thus becomes brittle and trauma or a fall will cause fracture of the bone.

BONE-CYSTS.

Bone-cysts may follow various lesions of the osseous system. Ostitis with sclerosis following same frequently antedates cystic changes in bone. Trauma is also a common cause. Bone-cysts may be single or multiple and are always intra-osseous. The Roentgenogram shows a **light,** intra-osseous space, not interwoven with islands of bone as in chondroma and the periosteum is not affected. It is differentiated from osteo-sarcoma from the fact that the latter rapidly becomes extra-osseous, invades soft tissues, expands the periosteum and also shows a clear outline of sarcomatous invasion of bone tissue, dark bone tissue being replaced by the light sarcoma corpuscles.

OSTEOMA.

Osteomata while generally associated with the osseous system may also occur in soft tissues (lungs, meninges, etc.). Small bony growths are designated as osteophytes; when the tumor extends over a large area as **exostoses.** When the growth is confined to the center of bony structures, it is called **enostosis.** Bony tumors may also develop from the enamel of teeth and are called dental osteomata; when developed from the pulp they are designated as odontomata.

Osteomata are classified as hard and spongy and may be single or multiple—most frequently the latter. These lesions are readily diagnosed with Roentgenography. All exostoses present irregular outlines, showing a darker shadow than true osseous tissue. They have a slow growth and do not involve the periosteum. It is of the utmost importance to differentiate this lesion from osteo-sarcoma. The osteo-sarcoma has involvement of the periosteum, a more regular rounded outline, the sarcoma tissue presents a homogenous light

Fig. 11—Osteo-myelitis, also Synovitis and Periostitis

shadow and has rapid invasion of the soft tissues. The light sarcoma as compared with the dark tissue of osteoma can be well shown on a properly developed plate.

An early diagnosis of **arthritis deformans** is claimed by Haenisch of Hamburg in the appearance of small exostoses or buddings of bone from the epiphyses. In cases of involvement of the knee, these points invade the joint from the spines of the tibia and are also noted at the extremities of the fibula and tibia. The patella also shows these buddings or pointed osteophytes very clearly. This is a very important point in diagnosis, as an early detection of arthritis deformans offers some hope for therapeutic success in this otherwise intractable disease.

Rheumatoid arthritis—arthritis urica—has characteristic, irregular exostoses in the phalanges, patella and also the epiphyseal portions of large bones. They are always multiple when examined and look like the thorns of small cacti.

OSTEO-SARCOMA.

The ability to diagnose promptly osteo-sarcoma by means of the Roentgen-ray is of great importance as the earliest possible removal of a sarcomatous growth is essential in order to avoid metastasis and to save life. The prompt surgical removal of small sarcomata, followed by vigorous Roentgenization of the affected area, has been successful in a number of cases under our observation during the past nine years.

Osteo-sarcoma may be periosteal—sometimes myelogenous or mixed. The favorite location is the end of long bones; rarely, if ever, are the epiphyses the starting point, although the tumor often spreads there by continuity of growth. The osteo-sarcoma usually starts as a sub-periosteal growth, raises the periosteum, separates it from the bone and gradually involves the whole circumference of the periosteum which may be destroyed from pressure. Bone sarcoma looks homogenous and produces a pale, light shadow as compared with bone tissue. It rapidly spreads into surrounding soft tissues and is not confined to bone. When osteoblasts are still present in the tissues a honey-comb appearance is noted.

Giant cell sarcoma is often found centrally located within the medulla, destroying and replacing the tissue and leaving a homogenous light center. When this lesion is discovered early, thorough chiseling, drilling and curretting will prove efficient and obviate amputation.

Osteo-sarcoma must be differentiated from osteoma, enchondroma, bone-cysts, osteo-myelitis, syphilis, gumma and tuberculosis of bone.

1. Osteomata have more irregular outlines than osteosarcoma, have darker tumor shadows, grow slowly and do not involve the periosteum.

2. Enchondromata are found usually on the phalanges and metacarpal bones and show characteristic islands of bone interspersing the otherwise light shadow of the cartilaginous tumor. They are usually **multiple,** while osteo-sarcoma is usually **single.**

3. Bone-cysts are always **intra**-osseous and have a regular homogenous outline (like sarcomata); the latter, however, quickly have extra-osseous extension with involvement of soft tissue. In addition bone-cysts are often multiple, sarcomata are not.

4. Osteo-myelitis is also intra-osseous with destruction of bone and if abscesses supervene, the surrounding tissues show darkened areas due to ostitis. Characteristic cavities and sequestra of bone are also to be found in chronic cases.

5. Syphilitic gumma presents a **dark, almost black** shadow and produces a spindle-like protrusion of the periosteum with irregular nodules. A large area of bone may be involved. The periosteum looks moth-eaten or net-like in some places. In sarcoma the bulging out of the periosteum is more localized and not spindle-shaped or fusiform—it does not affect as large an area of bone as syphilis and rapidly extends into soft tissues, while syphilis is confined to bone.

6. Tuberculosis of bone shows an indefinite, very pale shadow of bone with atrophy of same and no invasion of soft tissues. The joint affected may be much swollen but the bone itself does not partake of this process.

Fig. 12—Osteo-sarcoma. Enostosis of head of humerus.

SYPHILIS.

The Roentgen-ray has been of great service in the diagnosis of syphilitic bone lesion. Congenital syphilis, lues hereditaria lata and gumma show characteristic shadows upon the Roentgenogram.

In congenital syphilis there is periosteal enlargement about the metacarpal bones or phalanges or the metatarsal or tarsal bones may be affected similarly. The periosteal shadow appears like a cloak hung about bone and this dark envelope is **characteristic** of congenital syphilis. Syphilis does not produce atrophy of bone such as is found in tuberculosis—it produces an increase in shadow density, while tuberculosis causes a diminution of the shadow density and does not involve the periosteum. When we appreciate that the spirocheta pallida may enter the body in numerous ways aside from sexual contact, such as from smoking, drinking from infected cups, kissing, handling of coin which has been in contact with a mucous patch, examination of syphilitics and infection through contact as from an abrasion, hang-nail, etc. —any measure which will assist in clearing up questioned diagnoses in suspected cases should be welcomed.

Syphilitic periostitis or **gummatous periostitis** presents the following points in Roentgen diagnosis:

1. Irregular contour of periosteum.

2. When the continuity of the periosteum is destroyed, the tissue looks as though moth-eaten or reticulated.

3. Sclerosis of bone with increased shadow of the bone is always an accompaniment of syphilitic invasion.

4. In certain locations as the anterior surface of the tibia, a curve or bow-like protrusion is formed, due to the bulging out of the periosteum.

5. There is no atrophy of bone. (In tuberculosis there is.)

Differentiating these diagnostic points from other bone lesions we have:

1. In periostitis due to infection or trauma—there is increase of periosteal shadow but no involvement of bone—no

sclerosis of bone—the dark shadow of the gummatous deposits is also missing.

2. Non-syphilitic osteo-myelitis: This disease lacks the irregular contour of syphilitic bone invasion. Osteo-myelitis is usually confined to the shaft and soon causes abscesses, cavities and sequestra. The periosteal involvement in **non-syphilitic** osteo-myelitis is usually slight while in syphilis the periosteal and sub-periosteal areas are much involved.

3. Peripheral sarcoma—this lesion has circular periosteal enlargement of the affected bone and the sub-periosteal involvement presses out the periosteum which it soon destroys; involving neighboring tissues. The sarcoma tissue has a **light homogenous** shadow, while the gumma presents a **dark** shadow—and the soft tissues are **not** invaded by the syphilitic process, being confined to bone and periosteum.

4. Tuberculosis of bone—here there is absence of sclerosis —hence no **dark shadows** of the involved bone and while enlargements of joints are noted similar to syphilis, the bone itself tends towards **atrophy,** and presents a pale, sometimes hardly perceptible, shadow. In syphilis there is hyperplasia with characteristic periosteal involvement and local necrosis. Gummatous lesions are often multiple and the typical bow-like periosteal bulging and underlying sclerosis with **increased darkening** of shadows make the diagnosis a matter of certainty.

TUBERCULOSIS OF BONE.

Tubercular osteo-myelitis. Tuberculosis of bone is characterized by faint indefinite shadows due to lack of lime-salts—the plate has the appearance of having been over-developed. There is absence of periostitis and there are **no dark sclerosed** areas and atrophy of bone supervenes.

Macroscopically the joints appear enlarged but the **bones themselves** become atrophied. The enlargement being due to fungoid proliferation, does not show on the plate—when cheesy degeneration or calcification supervenes the shadows are more readily differentiated. Tuberculosis of bone occurs

Fig. 13—Tuberculosis of hip. Note light shadow of bone and atrophy of bone.

most frequently in the center of the epiphyses or below the articular cartilage, preferring the long bones, femur, humerus, radius and ulna and lower extremity. In children the vertebra are a common seat of the disease.

Tuberculosis of bone presents little difficulty in differential diagnosis:

1. Pale, indefinite shadow of bone; devoid of contrast.
2. Epiphyseal preference.
3. Atrophy of bone substance involving large areas.
4. Lack of periosteal involvement.
5. Lack of sclerosis and hence no dark shadows.
6. Enlargement of joint shadow, without increase of bone shadow.

Tubercular dactylitis must be differentiated from syphilis and osteo-myelitis. The latter rarely attacks the epiphysis, excepting by extension of inflammation, being an **intra-osseous** lesion.

Syphilis presents a dark shadow with marked involvement of the periosteum, forming a dark cloak or ring about the bones. Tubercular dactylitis has no periosteal involvement and the bone itself appears pale, excepting at the site of a circumscribed abscess where a single dark spot will appear.

GONORRHOEAL BONE LESIONS.

The writer has within the past year made a special study of this subject in conjunction with Professor Dr. B. G. Carleton of New York, who is particularly interested in noting the therapeutic effects of gonorrhoeal vaccines in chronic joint lesions.

The Roentgen-ray shows the deformity of joints and a general loss of shadow similar to tuberculosis. This loss of shadow is due to diminution of lime-salts and affects all contiguous bones at their involvement in the joint inflammation. The writer has particularly noted what he has termed "Carleton's spots" in all well-developed prints of gonorrhoeal joint lesions. These small spots present small

areas of sclerosis or localized inflammation and disappear when the lesion is improved. These spots have been noted previously after injuries or bullet wounds but in gonorrhoeal bone lesions they are multiple and we judge them to be pathognomonic from the fact that in some cases after vaccine and hyperemic treatment, they have disappeared.

Tophi in gout present similar small, frequently large spots —in this lesion, however, the spots are **extra-osseous** and other characteristic joint features are readily discerned.

To recapitulate the Roentgen diagnosis of gonorrhoeal bone lesions:

1. Deformity and enlargement of joints.

2. Diminution of shadow involving the peripheral portion **of all bones** of the affected joints.

3. Small sclerosed areas in the bone or epiphyses of bone. Carleton's spots.—These spots are always **intra-osseous.**

1748 Broadway, New York City.

DISCUSSION.

DR. PERCY BROWN, BOSTON, MASSACHUSETTS.

One cannot help but be impressed with the beauty of the lesions as presented in the epiphyseal ends of certain long bones, especially, as I remember, with regard to the shoulder joint. Dr. Diefenbach's presentation of these pathologic situations affords an opportunity for a consideration of a subject which I believe we are just opening up, and which, therefore, presents the greatest possibilities from a diagnostic point of view, especially with regard to methods. As I view the situation, I am convinced that an intelligent use of the Roentgen ray will be of much assistance in depicting the pathology of certain inflammatory diseases of bones and joints.

Taking up certain points mentioned by Dr. Diefenbach, I wish to refer first to syphilitic invasion of the long bones. I believe he correctly described the luetic involvement of these

FIG. 14—Gonorrhoeal arthritis.

bones as a "cloaking." I have not heard that term before, but it seems to be particularly apt. It also seems to me that the distribution of this cloaking is quite characteristic, to-wit: the "cloaking," or, as I call it, the infiltration of the medullary cavity, has a peculiar appearance in syphilis. For instance, over a certain area you will find the medulla completely sclerosed; and above and below this, it is not so. In the shaft of the long bones the appearance is that of the stories of a building. I attempted to present this characteristic before the Society in a paper I read on syphilis of bones at the Niagara Falls meeting.

Another condition not mentioned by Dr. Diefenbach in which the X-ray has given us a true and elaborate picture is that of the so-called Charcot's joint. Dr. Diefenbach showed one joint in connection with luetic invasion. I would like to ask him whether he recognized in that joint any of the appearances characteristic of Charcot's joint. Charcot's elbow is very uncommon; Charcot's hip and knee less so, and the ankle more rarely met with. The question of Charcot's joints as one of the possible results of luetic invasion is a most interesting one.

No mention has been made of what I consider the most important or at least one of the most important uses of the Roentgen ray, namely, the power which the ray gives us to subdivide bone and joint diseases that were formerly designated, by the old school classification, as constitutional conditions. I refer particularly to arthritis deformans. Formerly, it was absolutely impossible to subdivide arthritis deformans clinically or pathologically, as can now be done. What are these subdivisions? There are five. First, hypertrophic arthritis; second, atrophic arthritis; third, infectious arthritis; fourth, villous arthritis, with which is associated the formation of "fringes;" fifth, chronic gout. These five subdivisions are distinct entities. I have positive knowledge of this, as a result of some work in connection with bone and joint diseases. Of course, many writers consider them simply in one class, as arthritis deformans, but I believe that that is not correct, because in each variety a very distinct pathologic

picture may be obtained, a picture that is almost pathognomonic. For instance, what are the Roentgen ray findings that are pathognomonic of an osteo-arthritis, or the "hypertrophic type?" There are the hypertrophies of bones at the limitations of joint surfaces, the lippings out at the head of the tibia, for example, and the prolongations of bone at the margins of the patella. These findings are very suggestive of hypertrophic arthritis, also to a lesser extent, of the infectious variety.

A consideration of the atrophic type of arthritis deformans does not properly come within the limitations of this paper, because it is not strictly a disease of the bone, although it is one of the five varieties above mentioned. The essential change takes place primarily in the soft parts. There is here an atrophy of the synovia, causing the ends of the bones to come closer together.

In the great subdivision of the infectious diseases of bone, gonorrhea is included as an etiologic factor. Here we have hypertrophies of all sorts, of all types, sharp spicules and rounded surfaces, with a plastic change in the synovial tissue. A minimum degree of hypertrophy is seen in the little spurs of the os calcis, which sometimes must be thought to be of venereal origin. So far as I have been able to see, the slide which Dr. Diefenbach considered pathognomonic of gonorrhea cannot be considered to be so, any more than it is pathognomonic of any other infectious disease.

As soon as this plastic change takes place between the bones a general condition of plasticity occurs, and the bones are massed together. The function of the joint is limited as far as motion is concerned, because it is painful, as well as restricted. What follows? Atrophy, atrophy of the long bones, which is generally distributed. As atrophy of disuse increases, the cancellous tissue shows up clearly as beautiful lacework. The osseous intrinsic structures here become more and more marked, and although I have no means of proving it, it seems to me that these changes are often simply the bone tissue seen through a clear window of atrophy. The minute you get atrophy from disease or disuse, you see the

Fig. 15—Chronic ostitis with calcification of quadriceps tendon.

bone as through the eagle's eye. It will be very much more clearly portrayed.

I was greatly impressed with these excellent slides, and I most sincerely thank the doctor for presenting them to us.

DR. FRED H. BAETJER, BALTIMORE, MARYLAND.

I am very fortunately situated in Baltimore, where we have a large negro population, among whom gonorrhea is practically endemic. I have seen many cases and my experience has convinced me that it is absolutely a cartilage and joint disease. It is only after the cartilage has been eroded that the end of the bone is attacked. The shaft is never attacked by gonorrhea.

As to bony outgrowths, there are two types—the gonorrheal and the non-gonorrheal. When you cut down on them you find tiny bursae which are infected with the gonococcus, and that attacks the bone just at the insertion of the plantar fascia. The gonorrheal joint is a long-standing process extending over many months. If the wrist is affected, the patient has no use of his hand, and the result is some atrophy just as we see in cases of fracture and in tuberculosis. If the ankle joint is affected, it is painful and the patient cannot walk. Just beneath the joint surface is cancellous bone, with a certain amount of calcific material. When absorption takes place, that part of the bone shows more accurately because it contains less calcium. At other places where the bone is less dense, the process is more marked.

My own feeling is that those hard portions that Dr. Diefenbach called attention to are simply spots of non-absorbed calcium salt, and that we cannot say that it is characteristic of gonorrhea. It can be seen in any condition where the individual joint is affected, or where there has been lack of motion for some time. Take the well hand, tie it up for six weeks or more, and you will get exactly the same condition, the atrophy of disuse instead of the atrophy of disease.

DR. HENRY K. PANCOAST, PHILADELPHIA.

In regard to the case of osteo-malacia, I believe it was considered a spontaneous fracture. I have had no experience with the Roentgen examination of cases of oseto-malacia, but according to my recollection of the pathology of the condition, spontaneous fracture is not a frequent occurrence in these cases, if it occurs at all. The bones gradually become of the consistency seen in rickets, through absorption of bone structure, and are soft, not brittle, so that a spontaneous fracture would be hardly likely to occur, at least not without bending first. This bone did not show any signs of bending.

In regard to the lipping of the articular surface of the tibia in the knee joint shown, and also the little projections from the upper and lower margins of the patella, I think these appearances are almost pathognomonic of chronic arthritis. Just what type they represent I do not think we can always tell. It may be infectious at the start and become hypertrophic later on. The lipping of the edges of the tibia is more characteristic of the hypertrophic form. Both or either of these appearances are apt to be the earliest signs of the latter type, and give the first definite information of any trouble in the joint. The joint is examined because of pain, and often these signs will be all that is shown.

In some instances I have noticed that the projection from either the upper or lower margin of the patella points in a backward direction, giving it a hook-like appearance. In some cases of this kind such a projection would undoubtedly come in contact with the soft structures and occasion considerable pain on motion.

DR. GEORGE E. PFAHLER, PHILADELPHIA.

I want to thank Dr. Diefenbach for this excellent demonstration. I would like to agree with Dr. Pancoast that that particular case of osteo-malacia did not have the appearance of a case of osteo-malacia, which I had the privilege of studying. The bones were distinctly bowed, the cancellous spaces were

very much wider, and there was a more general absorption of lime salts. There was not a spontaneous fracture in this case.

DR. PERCY BROWN, BOSTON.

Referring to Dr. Dunham's case, he spoke of the proliferation of the proximal end of some of the phalanges. It looks like an inverted umbrella, and it seems to me that that condition is highly suggestive of a general condition consequent on acromegaly or elephantiasis ossium. These radiograms are always especially striking when compared with the radiograms of a normal bone.

Another point brought out by Dr. Hammond, regarding the mixed type (the atrophic and hypertrophic arthritis), I wish to call attention to, namely, that the hypertrophic type may be a consequence of the rubbing together of the articular surfaces in the atrophic type, or a compensatory hypertrophy, an overgrowth of bone due to continued and prolonged irritation.

L. G. COLE.

We are under obligation to Dr. Diefenbach for presenting such an interesting subject and for the amount of work he has done in preparing it.

Radiography determines definitely the location and extent of any lesion in the bones, and in certain classical cases, it is easy to differentiate the pathological conditions from each other.

Lack of radiographic pathology prevents this in many cases. The difficulty of obtaining radiographic pathology of bones is because most cases do not come to operation or autopsy, and though the radiographic findings may be characteristic of something, the diagnosis is not established, and we do not know what pathologic condition they really represent. If we disregard the cause and the tentative surgical diagnosis, we readily classify the cases radiographically.

Dr. Brown brought out that this was practically what had been done in the subdivision of the osteo-arthritis.

A plate which a number of physicians diagnosed as osteo-malacia has been exhibited at previous meetings as osteo-malacia.

I have exhibited at previous meetings of the Society, plate of a case that was diagnosed as osteo-malacia by the majority of the men who saw it, although some eminent physicians disagreed with the diagnosis. It was a child about 12 years old and the radiographic findings were such as Drs. Pancoast and Taylor have described. This illustrates the point just referred to, viz: that although the radiographic findings were very definite, it was not determined by operation or autopsy whether this case was osteo-malacia or not.

In regard to the early diagnosis of osteo-arthritis, and the nature of lipping of the bones, I was surprised to hear Dr. Diefenbach say that it is considered new. I agree with Dr. Pancoast, that lipping of the upper surface of the tibia is considered typical of a beginning osteo-arthritis of the hypertrophic type, and that many of us have recognized it for at least two or three years.

I have a plate showing the bones of the hand and fore-arm in conjunction with pressure on the nerves of the upper brachial plexus. When I showed this plate to Dr. Hickey and said that this resembled the infectious type of osteo-arthritis with decalcification along the distal ends of the bones, he asked if there was any indication of pressure on the nerves above this point. This illustrates the fact that we must consider pressure on nerves as one of the causes of atrophic form of osteo-arthritis.

DR. GEORGE C. JOHNSTON, PITTSBURG.

This question of bone atrophy from disuse is an important one. If the members of the Society will be on the lookout for these cases, we will have some excellent plates for the exhibit at the next meeting. Examine the extremities in cases where a plaster cast has been on for some time following injuries

from which the patients never suffered, such as cases of fracture of the hip that never existed, and those cases of trouble due to neuritis, where the pain caused by motion has compelled the patient to keep the part at rest. Many of these cases of atrophy will be found coming on after that sort of treatment; also in cases of fracture through the nutrient foramen where atrophy of the bone below that point will be found to be exceedingly striking.

DR. DIEFENBACH (closing the discussion).

This extended discussion is very gratifying. I would like to say, however, that I attempted to eliminate joint diseases from the discussion of bone diseases. I have had a large number of joint cases, both atrophic and hypertrophic, but in order not to make my paper too long I eliminated as far as possible the discussion of joint diseases. I think we ought to have occasional papers on diseases of bones and joints, because the subject is not only an interesting one, but important.

With regard to the criticism of the plate of osteo-malacia, I would like to say that I have seen six of these cases abroad, and the findings were harmonious with those shown in my plate. I have seen two cases, both accompanied by spontaneous fracture, occurring in people over fifty-five years of age, and in both the absence of lime salts with the shell-like appearance of the bone was so marked that I feel like maintaining the correctness of my diagnosis. Perhaps the cases seen by others occurred in young people. In one of my cases the leg was amputated at the thigh; the other patient was treated medicinally. Both patients improved remarkably under bone marrow treatment and lime salts, thus giving us a therapeutic confirmation of the diagnosis.

With regard to the gonorrheal cases, the points I mentioned were present in nearly all the cases. I am glad to have Dr. Baetjer's interpretation of these spots, as occurring in all cases of disuse. When I had a series of these cases, I investigated, and found the spots in the substance of the bone not in the joint or cartilage, but intra-osseous, and inasmuch as

these spots disappeared under treatment, I naturally drew the conclusion that they were quite characteristic. I am glad to know, however, that these same spots have been seen by others in cases of joint disease due to non-use. Further study of this diagnostic observation should be made before deciding upon its absolute value.

The case of fragilitas ossium I studied very carefully. It was a very abnormal picture, showing an absolute disappearance of all medullary shadow. In addition to that there was a marked sclerosis, evidencing a chronic osteitis with a loss of medullary substance, the result of some constitutional disease, which in textbooks on pathology I found described under the heading of fragilitas ossium.

SOME EXPERIMENTS AND CONCLUSIONS IN THE EXACT MEASUREMENT OF X-RAY.

BY DR. PEABODY.

Some months ago when the opportunity came for me to enter the field of general Radiography, I was confronted with a lack of any exact numerical information in all of the books on the subject, and to the seeker for exact information, they were not satisfying. I then consulted several expert operators, and I was like Omar Khayyam, "I did eagerly frequent Doctor and Saint, and heard much argument, but I ever came out the same door wherein I went."

I had a good physical laboratory and electrical training, which had not been used for a good many years, but I brushed off the cobwebs, and went at the problem from the standpoint of a simple problem in Physics, to find the amount of work performed, and the conditions under which it varies.

I am not an expert radiographer, and I ask your indulgence for any mistaken ideas as to the art which I may hold, as aside from this work of measurement, and some few cases that I have handled, my knowledge of the art has been all gained from several of the massive text books on the subject which tell us all about it but just **how** and leave one all at sea as to the actual conditions under which a given picture may be obtained.

I have spent most of my time during the last few months in getting that information, and shall apply it to all of the real work that comes my way, when by an analysis of the conditions under which certain effects are produced, I hope to be able to reproduce that work on any apparatus and with any tubes at hand, without any preliminary experimentation.

I realize that many men have had this same idea in mind when they have recommended some of the measures of penetration that I have seen described, but I believe that I

shall be able to show that I have produced a general algebraic equation which applies to the work done by the X-ray under any and all conditions, and which is expressed in terms which are simple, practical and easy of application to the problems of the individual operator, so that he can approach any of these problems with the same confidence as the engineer who is called upon to calculate the dimensions of an engine to do a given duty.

The fundamental principles involved are all but one based on known physical laws and with a little patience the other can be demonstrated.

As a starting point, we will take one of the first laws of physics, that, "The work done by any force varies with the time through which it acts."

This is demonstrated experimentally on Plate 1, on which there are two series of exposures made through a hole in a heavy sheet of lead.

Take any tube and adjust it so that one of each of two series of exposures may be made at the same time during the first exposure, then make several succeeding exposures for the same time in such a manner that part of each exposure overlaps a part of one of these exposures and all of the preceding exposures. Then on other parts of the plate make exposures of two, three, four and any multiple of the first time. The first series will give you a spot of graduated density in which each difference represents one unit of work done, plus one, two, three, and four units of work, done separately and added to the preceding work, while the second series will give several spots, each of a different density.

If upon developing such a plate, the densities of the different parts of the first series coincide with the densities of the separate spots, it is a practical demonstration and proof of this law.

The second principle involved is the physical law, "that the work done by a given light varies inversely as the square of the distance from the source of light."

It can be proven that the X-Light follows this law.

To prove this, take any light which is being produced under constant conditions and make one exposure through our sheet of lead at a unit distance D, and expose for a unit time S, when the simple formula

$$\frac{S}{D^2} = W$$

in which W = the work done, will be an algebraic representation of the principles involved.

Now as we move our plate twice as far from the source of light, our formula becomes

$$\frac{S}{(2D)^2} = W$$

upon the solution of which S=4, so we expose our second spot for four times the time of the first.

Upon moving the light three times the first distance our formula becomes

$$\frac{S}{(3D)^2} = W$$

and S=9, so we expose the third spot for nine times the time of the first.

If upon developing such a plate we find that all of the spots are of the same density, this becomes a demonstration and proof of the value of this factor.

The next principle involved is that the work done by any X-Light varies with the quantity of current passing in the tube, other conditions remaining constant.

Let us take another plate, and setting our tube at a distance D, adjust our current so that one unit of current is passing, when the formula

$$\frac{C\ S}{D^2} = W$$

will represent the conditions of the first exposure. Now how long must we expose to produce the same effect with twice the current?

The formula

$$\frac{2C\ S}{D^2} = W$$

will represent the conditions of the exposure, and by solution $S = \frac{1}{2}$.

Expose a series of spots according to this law, and if they all develop of the same density, it is proof of the law.

The next factor of our problem is the one which has proven the stumbling block to the average operator and in looking around for a suitable instrument to measure this factor, I found only one which seemed to be built on correct principles. This was the Radiometer of Prof. Wehnelt's design, and while I have not been able to procure the dimensions of the unit he employs, it can be proven by experiment that the work done by any X-Light varies with the numerical reading of this instrument, other conditions remaining constant.

The proof of this is a delicate and difficult experiment to carry out under exact conditions, but the collective evidence of many experiments carefully checked, goes to show that the above statement is true within the limits I have been able to produce, which limits are over two-thirds of the scale of the instrument.

Assuming this value to be true our equation becomes

$$\frac{S\ C\ P}{D^2} = W$$

If we take a tube showing a penetration of 1, set it at a unit distance, and pass a unit current through it, by solution of our equation $S = 1$.

Now let us make such an exposure as before, and then take another tube of the same dimensions showing a penetration of 10 and adjust it as before. Now our equation becomes

$$\frac{S\ C\ 10P}{D^2} = W\text{, and } S = 1/10.$$

If we make a series of exposures with tubes of the same dimensions of different penetrations, carefully adjusting so that the other values remain constant, you will have another plate on which the spots will be of like density, so the formula

$$\frac{S\ C\ P}{D^2} = W$$

becomes an expression of the work done during any X-Light exposure, using a tube of unit dimensions.

This formula as an expression of exact physical laws may be used as the basis of a system of units to measure the X-ray.

I have purposely avoided mentioning any measurement in other than general terms, for the values to be assigned to these factors to make a useful system of measurement must of necessity have the endorsement of the Society so I have left this in the form of a general equation.

From this formula I have deduced another formula which I have used for several months in calculating the exposure to be given for any radiograph, and while I am not prepared at this time to go into this I would say that I have a slide rule graduated in terms of the equation, and it has proved a simple and efficient exposure meter for several months past, and I have produced a most satisfactory lot of negatives, using any tube in my laboratory with any current dosage, and at any convenient distance.

This formula is

$$\frac{D^2\ T^2}{C\ \ P^2} = X$$

D = distance in inches between the target and plate.

T = thickness of tissues in inches, measuring the actual bone and muscular tissue, and making allowance for contained cavities, as in the thorax where the thickness of the

shoulder at the head of the humerus, serves as a useful index.

C = current measured in milliamperes.

P = Wehnelt Penetrometer reading.

X = exposure time in seconds.

This formula is based upon a hypothetical unit light, and applies to the Lumiere plate.

Each make of plate has its own speed index, by which the value of X must be multiplied, but in practice it is not necessary to complicate our equation, as among all of the X-ray plates I have used, I find that the extreme limits of speed are 1:3 and once the operator knows this fact, and uses his knowledge of varying the time of exposure, and character of light to suit purposes, the exposure meter gives him a standard of exposure time which he can vary with exactness to produce a given result.

I hope in another year to be able to make a mathematical analysis according to this formula of the work of some of our best men, and put it in the form of exact knowledge for the use of physicians who have not the facilities of the expert, and I know that I can increase the usefulness of many small outfits that are at present lying idle because the owners can not get the exact information they need.

For instance, I placed my instruments in the hands of a physician friend, who thought that his apparatus was not able to do the work of making a good abdominal plate, or at least he had never been able to do so, and he sent the patient to me. I met him the next day and after half an hour's instruction in the use of the proper instruments, he made the best abdominal picture that he had ever seen, in that he had demonstrated the transverse processes of the lumbar vertebrae, and the muscular detail of the region, together with some kidney shadow.

This instrument and the accompanying information will not make a specialist of every physician who owns an X-ray outfit, but it will make it possible for the average owner of a

small outfit to become more familiar with the possibilities of the X-ray, and in proportion as the average physician progresses, will he find occasion to consult the specialist.

This matter, however, is beyond the scope of this paper and will be made the subject of another communication, when I hope to present it in finished form.

The more one studies this matter from the standpoint of pure physics, the more interesting it becomes, and to the man accustomed to physical measurements, it opens the possibility of reducing the whole proposition to C. G. S. units, and the formulation of a system of unit measurement for practical every day use, which will be as exact as the electrical units in use to-day.

These experiments are some of them very delicate, and all of them must be conducted under conditions which will preclude the possibility of error in order to produce a perfect result, and the one with the various penetration factors will be one that the average man will have some difficulty to carry to a successful conclusion, without a good deal of preliminary study of the possible sources of error.

However, I have one plate which I spent two months to get on which I felt sure that every source of error had been eliminated, and which upon development shows an absolute coincidence of the various exposures, which were all made with different tubes, and I have a great many plates in my scrap barrel that have been failures in that one or two of several exposures would show a difference which though slight made the work of value only as a comparative test, and as the general run of the work would vary in both directions I felt sure that the variations were due to error, and I finally adapted a technique for making these tests which would show me the error before development.

I made over thirty such plates, before I finally succeeded in making six exposures that I felt were reasonably exact, and this plate I will exhibit to those interested, together with others of the whole series.

DISCUSSION.

DR. E. W. CALDWELL, NEW YORK CITY.

The problem of measuring the quantity of X-ray emanating from a tube is a difficult one to solve, and any promise of a practical solution always excites interest. Dr. Peabody in opening his paper said that he was not an expert radiographer, which would rather militate against anything he might tell us about measuring the X-ray. The plates he has shown are a very pretty demonstration of certain physical laws concerning radiant energy and the effect of radiant energy on photographic plates. The fact that the work done by radiant energy proceeding from a certain point, and passing through a homogeneous medium which does not absorb that energy, is proportionate to the square of the distance has long been recognized in optics. It is, however, a satisfaction to see it proven, that with a tube working in air the effects produced on a photographic plate at varying distances check up so nicely according to this law. It is also very gratifying to have a demonstration that the empirical scale of this penetrometer is made so that the units on this scale vary directly with the photographic effect of the rays delivered, the constant current coming through the tube. This is a matter which I have long doubted, and these experiments, if there is no error in them, seem to prove this very nicely.

I regret that there is some gap between this demonstration of physical facts and the final formula given to us. If I have it correctly, the last formula is D^2 T^2 over CP^2. This translated means that the effect will be directly as the square of the distance, directly as the square of the thickness of the subject, inversely as the strength of the current, and inversely as the square of the penetration. I think that this must be an error in the doctor's typewriting, because he has already demonstrated something that is entirely the opposite of what this formula would lead one to believe. I regret that the doctor did not give us further demonstrations of just how he

gets his results before he gave us this formula. These experiments are exceedingly interesting and valuable, but it is questionable whether his results are practical. It seems to me that there remains much to be done.

The very excellent penetrometer which he described is not a safe nor a convenient instrument to use, and all his measurements depend on that. In the first place, those who are afflicted with the speed mania know that in making rapid exposures the change in penetration in a tube in one second may be enormous. Then, after all, I do not believe the chief difficulty we have in making plates is in estimating the length of exposure. It seems to me that that is one of the least of our troubles. What bothers us most is to get the right kind of a ray for a sufficient length of time, and more important than anything else is the suppression of undesirable rays, which are always present in a more or less degree.

In making these criticisms, I wish to compliment the doctor on the manner in which he performed these very tedious experiments. They are certainly of value as well as of interest.

DR. GEORGE E. PFAHLER, PHILADELPHIA.

Dr. Peabody certainly has taken a step in the right direction, although he has not covered everything. I can agree with all Dr. Caldwell said, and I feel that the more attention the roentgenologists pay to these factors, the more uniform their work will be. However, there is so much variation in the penetration of a tube even during a very short exposure, that the results of our work are modified very considerably. It is these things of which we must take cognizance in order that we will do our work properly and get the desired results. I do not believe that this work will ever be quite as mechanical as Dr. Peabody's formulas might lead one to think, but he is working in the right direction, and it is not only possible, but probable, that eventually we will reach the desired degree of perfection in our work by means of some such method as Dr. Peabody outlined.

MR. H. W. DACHTLER, TOLEDO, OHIO.

I would like to ask whether or not the reading is as Wehnelt uses in his standard measurements. It looks to me as though the formula would allow us to bring up tubes of different penetration to about the same condition simply by supplying enough voltage. It seems to me that the doctor is varying the conditions in his tube so as to make them more nearly uniform or at least approximately so. Therefore, I would like to know whether the Wehnelt reading is taken under standard conditions, and how that is determined.

DR. CALDWELL.

The doctor pointed out that he takes the penetration into consideration in every measurement he makes. One thing I omitted to say was with reference to the square of the distance law. That applies to homogeneous media, which do not absorb the rays, to any perceptible extent. If you have a distance of twenty inches between the tube and the plate, and half that distance is taken up by the abdomen of the patient, you have not a homogeneous medium, and the law is subject to change. In the cases you meet in practice the condition to be dealt with is a much more complicated one than it is in the experiments, which illustrate very beautifully that the law is true in so far as it applies to making exposures on the photographic plate, which has nothing interposed between it and the tube except air. Beyond this point there is no demonstration.

MR. H. C. SNOOK, PHILADELPHIA.

It is very gratifying to me that Dr. Peabody has confirmed my original observations to the extent that the photographic effect made on a plate by a tube is approximately proportionate to the current passing through the tube, the penetration remaining a constant factor. Dr. Dachtler referred to the fact that this penetration changes with the current in the tube, and it seems to me that this change in the degree of penetra-

tion of the tube with the varying current, together with the very great tendency the tubes have to change their vacuum and degree of penetration, is the one great stumbling-block in the way of any practical application of any formula of this kind.

DR. PEABODY (closing).

With regard to the exposure of the patient, I will describe some of the experiments I made, although I did not bring the plates because I did not want to complicate this work. The first thing to prove the value of this formula is that we can deliver a given amount of energy from a tube and measure that energy. That is enough for any man to accomplish in one year. I have found that the exposure equation works very satisfactorily in general practice, at least it did in every case in which I applied it, which includes all kinds of work, sinus work, abdominal work, extremities, etc. The thickness of tissue factor I demonstrated by taking a given tube, making a given exposure at a given distance. Then I took six such pieces of paper and piled them one on top of the other, and exposed for a varying time. You will find that by exposing six times as long you will not get anything like the density in the original negative, but expose twenty-six times as long, and you get excellent density in the bony parts of the picture. One fact is that a photograph is a very flexible proposition. Exposures may vary from the standpoint of energy delivered to the plate from one to three and still get a readable plate, and yet not have anything in the third exposure that you have in the first.

As to the difficulty of the quantity of rays used, that is a matter I want to speak about. The quantity of the ray is measured accurately. Take the two pictures of the hands and examine them carefully. One was made with an extremely low tube that would probably not back up over two inches, while the other was made with a tube that would back over six. You can easily see that one part of the plate is quite a little darker, indicating that there has been more energy delivered from the tube to produce this result. But

in this case we are working with resistance instead of without it; so that there are two fundamental laws of physics that it might be well to consider. They open up a new line of thought as to the nature of the X-ray.

As to the change in the penetration of the tube, that is a factor no formula can control. It is entirely a question of the individual's ability to manipulate his apparatus properly. The tubes I have used for several years and which are still in service, and some new tubes I have, will make a pelvic picture before five seconds without a change of over one point on the Wehnelt penetrometer. As to the diminution of the tube, the formula I have given you is intended to serve no purpose whatever except as a measure of the energy delivered from the tube, and after this work is carried on a little farther, I will give you the final results. I have done much more work than I have shown here today; otherwise, I would not have come before you, but I am not quite ready to draw definite conclusions, although I expect to be able to do so at the next meeting.

ZIRCONIUM OXIDE, A NEW SUBSTITUTE FOR BISMUTH COMPOUNDS IN ROENTGENOLOGY.

BY HENRY HULST, M. D.

Dr. C. Kaestle announces in the Münchener Med. Wochenschrift No. 50, 1909, that he has found an efficient and thoroughly unobjectionable substance for an X-ray meal, which at the same time is not too expensive. Bismuth combinations can be entirely dispensed with. Since the employment of bismuth salts in X-ray examinations may endanger the health, and even the life of the patient, as can no longer be denied, it follows that henceforth all bismuth preparations are tabooed. Not only the subnitrite, but also the oxycloride and subcarbonate are included in this category.

The oxides of iron which have been proposed as substitutes absorb the rays considerably less than does bismuth. For equal density of shadows three or four times as much magnetic oxide of iron or burnt anhydrous sesquioxide of iron (Fe_2O_3) is required as of bismuth subcarbonate. A relatively greater mass being required, as fine pyloric detail is unobtainable. Being black, these substances cannot be given with milk or water, and chocolate or some other substance must be added to overcome the patient's disgust.

Thorium oxidatum anhydricum, another substance recommended by the same author as an occasional substitute, is entirely inert and absorbs the rays better than any other substance ever tried. If it were less expensive, it would be the ideal thing to use in all cases and under all circumstances.

Zirconium oxide is a white odorless and tasteless powder, practically insoluble in all acids. Bismuth and iron salts cannot be compared with zirconium in this respect. Numerous experiments have shown that the alimentary canal can do nothing with this chemical but get rid of it in the usual man-

ner, and that without subjective or objective deviations from the normal. Hypodermatic injections of zirconium oxide produced no effects in dogs and rabbits; neither albumen nor casts appeared in the urine. Pharmacologically and toxicologically nothing has been known hitherto about the behavior of zircon in the animal organism. Kaestle's experiments on rabbits and dogs go to show that it is without physiological action. This is in striking contrast with bismuth, which proves fatal to rabbits when absorbed in doses of 0.03 g. per kilo animal and in even smaller doses for dogs. In milk, water, kefir, or puree one and one-half parts of the oxide of zircon give shadows equal to one part of bismuth subcarbonate. On account of its pure white color and the possibility of reducing it to an impalpable powder it is easily incorporated into purees, and the most finicky people take it without trouble.

Per rectum Kaestle recommends 150-200 g. oxide of zircon stirred into one litre lukewarm water by means of 200 g. Bolus Albae. On account of its entire harmlessness 75 g. per mouth and 200 g. for enemata may be exceeded indefinitely, as the author says he has done repeatedly.

Until recently zirconium oxide was quite expensive. Merck's Index, 1907, gives its price as between that of strychnine and veratrine. A German firm now makes it in quantity, and the Polyphos Electr.—Ges. m. b. H., München, sole distributors, sell it for 11 m. p. kilo. The representative of the Polyphos Co. in this country will no doubt be able to furnish it now, or soon.

COMMENT BY DR. GUIDO HOLZKNECHT UPON "NOTES FROM SOME OF THE ROENTGEN LABORATORIES OF EUROPE, BY G. E. PFAHLER, M. D., PHILADELPHIA, PA."

Privatdocent for Medical Radiology, Director of the Institute for Radiologic Diagnosis and Therapy at the Royal and Imperial General Hospital, Vienna.

I am much honored by the recognition which Dr. Pfahler gives my institute, which he recently visited. What prompts me, however, to make comment upon his "Notes" is an unfounded observation which may tend to retard the development of a branch of radiology in which Dr. Pfahler himself has rendered great service, namely, radiology of the stomach and intestines.

As he himself says, the thorough use of fluoroscopy has given superior results in this work and I might add that the photographic technique is only an occasional supplement—although a very important one—to the fluoroscopic method of examination. The fluoroscope reproduces the living, while the radiograph records accidental or improvised phases of fluoroscopy.

Nevertheless we would have to desist from fluoroscopy with all its advantages if it were correct, as Dr. Pfahler claims, that the stomach examinations by fluoroscopy with the necessary palpation behind the screen, minus the protection of the lead-glass, injured the hands of the operator and that this was the cause of the bad condition of my hands.

In the interest of the unhampered development of this branch of radiology, I must make the following statement:

(1) The condition of my hands is not at all bad. Single hyperkeratoses (about ten of the size of a pea) are scattered in a somewhat shriveled skin, which resembles a senile laborer's hand.

(2) This condition resulted twelve years ago from fluoroscopy without protection, and since that time is unchanged. Since I have worked out the stomach examination by means of the fluoroscope, no appreciable change in my hands has occurred.

(3) The changes in my hands involve only the dorsal surface, the fingers and the ulnar side of the forearm; that is, those regions which, by holding the screen and the simple perforated diaphragm without hand protection, were exposed.

(4) In fluoroscopy of the stomach the volar surface of the palpating hand is exposed to those rays which have traversed the patient's body. My hands show no changes on the volar surface.

(5) My co-workers and assistants who for years have practiced almost as much fluoroscopy as myself, show on the exposed volar surfaces no changes. Indeed, in spite of the carrying out of my entire system of technique they have suffered no permanent injury.

(6) The harmlessness of palpation behind the screen we must attribute to the fact that for stomach examination deeply penetrating and therefore inactive rays are employed; further, that these rays which have traversed the patient's body are greatly weakened as well as filtered, and finally that the exposure of the hands occurs only a few seconds at a time at intervals. The resulting slight changes are apparently recovered from by the regeneration power of the tissue which has been experimentally demonstrated by recent work of Jollasse and others.

I conclude then that the examination of the stomach as practiced by me is entirely harmless to the operator.

BOOK REVIEW.

Röntgenatlas der Lungentuberkulose. Von Dr. Otto Ziegler, Dirigierender Arzt der Heilstätte Heidenhaus bei Hanover und Dr. Paul Krause, I. Assistenarzt an der Heilstätte Heidenhaus bei Hanover. (Zugleich II. Supplement-Band zu Beiträge zür Klinik der Tuberkulose, herausgegeben von Prof. Dr. L. Bauer.) A. Stuber's Verlag im Wurzburg, 1910.

This splendid atlas consists of 61 reproductions upon special photographic paper. There is a short preface and 16 pages of reading matter as an introduction. Each plate is accompanied by a history of the case with physical and laboratory findings in full. The post-mortem findings are given in several cases. The photographic reproductions are about five by seven inches in size, reduced from plates of about eleven by fourteen inches. They are beautiful in detail.

For the study of the Roentgen findings of the tubercular chest and its value in comparison and conjunction with the physical examination, this book offers splendid evidence. A conservative frankness lends satisfaction to the critical reader.

There are short paragraphs of comment attached to each case report, which becomes especially pertinent where the post-mortem furnishes the means of estimating the amount of pathology projected upon the Roentgen negative and the correctness of the interpretation.

There is no doubt that this is the best atlas upon the tubercular chest that has been presented up to the present time. It should find its way to every physician who is attempting to diagnose chest pathology. Especially, should this book be in the hands of every physician and roentgenologist who is interpreting lung negatives. As a reference book its value is paramount. Price, 40 marks. (S.)

The Medical Profession mourns the loss
of
DR. MIHRAN K. KASSABIAN

EDITORIAL

ANNOUNCEMENT

of the

Next Annual Meeting

To be Held September 29-30 and October 1

at the

Hotel Cadillac, Detroit, Michigan

Through the courtesy of the president, Dr. George E. Pfahler, of Philadelphia, Pa., we submit the following as a preliminary program.

A perusal of the titles of the papers will show that the papers which the committee has thus far secured are of the highest quality, and it is confidently expected that many other valuable papers will be presented.

The space allotted for the manufacturers' exhibit has all been sold, and the makers of roentgen apparatus will display at this meeting the latest and most improved types of generators and specialties.

The committee having in charge the plate exhibit reports many reservations of space for the demonstration of plates, and it is confidently expected that a large series of excellent and instructive roentgenograms will be shown.

The lantern slide feature of the meeting is also deserving of careful attention, and promises to be very fruitful of instructive ideas.

Preliminary Program

"Stereoscopic Examination of the Chest."
Dr. Kennon H. Dunham, Cincinnati, Ohio

"The Diagnosis of Gastric and Duodenal Ulcer by Means of the Roentgen Rays.
Dr. Howard E. Asbury, Baltimore, Md.

"Skiagraphic Delineation of the Head of the Pancreas" (with Lantern Demonstration).
Dr. A. W. Crane, Kalamazoo, Mich.

"Fluoroscopy of the Gastro-Intestinal Tract."
Dr. Edward H. Skinner, Kansas City, Mo.

"Kimnemotographic Roentgenography."
Dr. Fedor Haenish, Hamburg, Germany.

"Kimnemotographic Roentgenography."
Dr. Lewis Gregory Cole, New York.

"Stereoscopic Radiography as an Aid to the Surgeon."
Dr. Emil G. Beck, Chicago, Ill.

"The Removal of Foreign Bodies under Fluoroscopic Examination."
Dr. Charles F. Bowen, Columbus, Ohio.

"A Localizer for General Use."
Dr. Clarence E. Coon, Syracuse, N. Y.

"Description of a Method of the Measurement of the Female Pelvis."
Dr. Willis F. Manges, Philadelphia, Pa.

"Serious Mental Disturbances Caused by Painless Dental Lesions."
Dr. Henry S. Upson, Cleveland, Ohio.

"The Value of Roentgen Examinations in Oral Surgery."
Dr. I. M. Schamburg, New York.

"Demonstrations of Lantern Slides or Negatives of Special Cases."
By Various Members.

"Demonstrations of Mastoid Skiagrams."
Dr. Sydney F. Lange, Cincinnati, Ohio.

"The Attitude of the Law Toward Roentgenology."
Dr. Percy Brown, Boston, Mass.

"Physics and Optics of Stereoscopic Roentgenography."
Clyde M. Snook, Philadelphia, Pa.

"Chronic Joint Diseases from the X-ray Point of View."
Dr. Roland Hammond, Providence, R. I.

"Case of Prostatic Hypertrophy—Symptomatic Cure by X-rays and High Frequency Currents."
Dr. Sinclair Tousy, New York, N. Y.

"The Use of Radioactive Bodies in Comparison with the X-rays."
Dr. W. S. Newcomet, Philadelphia, Pa.

"Anti-Operative and Post-Operative Treatment of Malignant Disease."
Dr. Russell H. Boggs, Pittsburg, Pa.

"Enlargement of the Thymus Gland Treated by the X-rays."

ROENTGEN INDEX

July 1909—June 1910

Containing a nearly complete list of Roentgenological essays and papers in the American and English medical press with the addition of many titles from the German.

Compiled by

David R. Bowen, M. D., Rome, N. Y.

Writer's name and address in Authors' Directory following.

The heavy-faced numbers (**36**) refer to Directory of Periodicals immediately following this list.

APPARATUS AND TECHNIC OF MEASUREMENT, EXPOSURE METERS, ETC.

Exposure Meter, The. A New Help for Roentgenography. (The Winter-Peabody Slide-rule.)
Janus, **36** (xiv iv). Dec. 21, '09, p. 253.
Control Scale for the Correct Choice of Tube and Exposure Time.
Beez, **36** (xiv iii). Nov. 12, '09.
Abst. **7**, Mar., '10, p. 146.
Measurement, On the; of the Intensity of Roentgen Irradiations.
Walter, **11**. Oct., '09, p. 134.
Measurement of the X-Rays. Instruments for the Direct.
Villard, **11**. Sept., '09, p. 107.
Measurement of the X-Rays, The Physical.
Allen and Dunham, **11**. Jan., '10, p. 242.
See also Transactions of Am. Roentgen Ray Soc., 1907.
Plate Exhibit Rack.
Gray, **7**. Dec., '09, p. 39.
Screen, Intensifying. (Gehler Folie.)
Albers-Schonberg, **79**. No. 23, '09.
Long Abst., **11**. Mar., '10, p. 313.
Screen, Intensifying (Gehler Folie).
Rosler, **36** (xiv iv). Dec. 21, '10, p. 267.
Screen, Urarium Intensifying, A Very Adaptable; for Roentgen Plates.
Forssell, **36** (xiv vi). Feb. 24, '10, p. 419.
Shutter for Teleradiography, Instantaneous.
Hall-Edwards, **11**. July, '09, p. 38.
Shutter, An Automatic; for Instantaneous X-Ray Exposures.
Hazleton, **11**, Nov., '09, p. 179.
36 (xiv v). Jan. 18, '09, p. 346.
Stereometer, Furstenau's Roentgen.
Ed. **11**. Nov., '09, p. 181.
Technic, Improved Roentgen Ray. (Double target tube.)
Levy-Dorn, **33**. Dec. 9, '09, p. 2170.
Technic, Improved Roentgen Ray.
Dessauer, **59**. Feb. 20, '10, vi No. 8.
Technic, Improved Roentgen Ray.
Dessauer and Wiesner, **59**. Nov. 2, '09, p. 2268.
Abst. **11**. Jan., '10, p. 258.
Roentgenography, Actual Instantaneous.
Dessauer, **36** (xiv 4). Dec. 21, '09, p. 250.
Roentgen Exposures with One Induction Impulse.
Koch **36** (xiv 5) Jan. 18, '10, p. 345.

BISMUTH.

Bismuth Subnitrate and Other Bismuth Preparations Used in Roentgen Diagnosis. The Question of the Poisonous Action of.
Schumm and Lorey **36** (xv 3). June 2, '10, p. 150.
Bismuth Subnitrate Vaseline Paste, Poisoning from.
David and Kaufman, **39**. Oct., '09, p. 370.
Bismuth Paste, Poisoning from Bismuth Subnitrate in the Use of.
Anderson, **76**. Jan., '10.
Bismuth Poisoning, The Prevention of.
Beck, E. G., **26**. Apr. 23, '10.

Tuberculous Sinuses, Results of Injection of Beck's Bismuth Paste in. (Careful summary, mostly commendatory. Three Roentgen plates.)
Baer, **21.** Oct., '09, p. 318.
Tuberculous Sinuses, Bismuth Paste Treatment of. (With radiographs.)
Ridlon and Blanchard, **5.** Aug., '09, p. 35.
Abst. **43.** Aug. 7, '09, p. 478.

DERMATITIS, CARCINOMA, UNTOWARD EFFECTS. PROTECTION OF OPERATOR.

Cicatrices, Roentgen, Improvement of by Fibrolysin Injections and the Quartz Lamp.
Becker, **36** (xiv 3). Nov. 12, '09.
Abst. **7.** Mar., '10, p. 146.
Costal Cartilages, Premature Ossification of as a Possible X-Ray Injury.
Wiesner, **59.** May 24, '10, p. 1124.
Carcinoma, X-Ray.
Ed., **43.** Jan. 8, '10, p. 134.
Carcinoma, Roentgen Ray.
Rowntree, **19.** Sept. 25, '09, p. 862.
Carcinoma, X-Ray and Other Severe X-Ray Lesions, Surgical Treatment of.
Porter, **44.** Oct., '09, p. 357.
Dermatitis, X-Ray, Its Cure and Prevention.
McCoy, **3.** Nov., '09.
Abst. **11.** May, '10, p. 401.
Dermatitis, Pathologic Histology of X-Ray, and Early X-Ray Carcinoma.
Wolbach, **44.** Oct., '09, p. 415.
Dermatitis, X-Ray, and Protection.
Hall-Edwards, **11.** May, '10, p. 374.
Dermatitis, Radio, and Its Experimental Production in Animals.
Rowntree, **11.** Sept., '09, p. 104.
Hyperkeratosis Subungualis (Unna) as a Roentgen Injury.
Wehrsig, **59.** Aug. 10, '09, p. 1644.
Reaction, a typical, to Roentgen Ray Exposures and Little Known Sequelae.
Zehden, **17.** Jan. 3, '10, p. 16.
Safety of X-Rays to Modern Radiologist.
Pirie, H., **11.** Mar., '10, p. 314.
Testicle, The Influence of Roentgen Rays on.
Simmonds, **36** (xiv 4). Dec. 21, '09, p. 229.
Ulcers, X-Ray, Cured by Hilton's Method.
Savill, **48.** Dec. 18, '09, p. 1811.
Long abst., **11.** Mar., '10, p. 334.

DIAGNOSIS OF PATHOLOGICAL CONDITIONS.

Acromegaly, Clinical and Radiologic Observations in a Case of.
Rotky, **36** (xiv 5). Jan. 18, '10, p. 323.
Aneurisms, Aortic, X-Ray Study of 25 Cases of.
Lange, **28.** Feb. 19, '10, p. 219.

Brain Tumor.

Brain Tumors, The Radiography of Intracranial Processes in Internal Medicine with Especial Reference to.
Klienberger, **36.** Oct., '09.
Brain, Tumor of the Base of, Diagnosed by the Roentgen Ray.
Algyogyi, **36** (xiv 4), Dec. 21, '09, p. 257.
Pituitary Tumor in Its Surgical Relations. (With six radiographs of normal and pathological sella turcicae.)
Church, **43.** July 10, '09, p. 97.

Bone Disease.

Achondroplasia.
Fussell, McCombs, de Schweinitz and Pancoast, **43.** Nov. 13, '09, p. 1614.
Achondroplasia and Cretinism, The X-Ray Diagnosis of.
Pancoast, **7.** Mar., '10, p. 87.
Atrophy, An X-Ray Study of Bone.
Corson, **8.** Mar., '10, p. 289.
Bones and Joints, Differential Diagnosis of Pathologic Conditions of by the X-Ray.
Cushway, **22.** Sept., '09, p. 105.
Carcinomatosis, Skeletal. (Includes correspondence with several roentgenologists.)
Hawley, **8.** May, '10, p. 636.
Calcaneodynia, A Case of.
Morton, **11.** Dec., '09, p. 210.
Cysts of the Long Bones.
Simmons, **18.** Sept. 16, '09, p. 392.
Exostoses, A Case of Multiple.
Mollow, **36** (xv 3). June 2, '10, p. 173.
Exostosis of Os Calcis, A Case of Extraordinarily Large.
Janowsky, **36** (xiv 4). Dec. 21, '10, p. 268.

Fragillitas Osseum Universalis, A Case of.
Kienbock, **36** (xv 3). June 2, '10, p. 143.
Leontiasis Ossea, A Case of.
Cole, J. J., **22.** Sept., '09, p. 141.
Osteo Chondritis of the Tuberosity of the Tibia and the So-called Osgood-Schlatter Disease.
Kienbock. **36** (xv 3). June 2, '10, p. 135.
Osteitis Deformans, Two Cases of.
Mainwaring-White, **15.** July 3, '09, p. 12.
Osteomyelitis Chronic.
Beck, Carl (Chicago), **73**a. Feb., '10, p. 113.
Osteomyelitis of the Lower Jaw. (Surgical treatment. Five x-ray plates.)
Germain, **43.** Sept. 18, '09, p. 924.
Ossification Centers, Inflammation as a Factor in the Development of.
Dachtler, **7.** Mar., '10, p. 113.
Sarcoma of Bone, A Note on.
Barling, **73**a. June, '10, p. 631.
Sarcoma, Bone. (Twenty cases. Radiographs by Jaches.)
Buerger, **73**a. Oct., '09, p. 431.
Sarcoma of Bone, Diagnosis of by Means of the X-Rays.
Granger, **11.** May, '10, p. 372.
Scaphoid (Tarsal), Isolated Disease of, in Children as a Symptom of Disturbance in Development.
Behn, **36** (xiv 4). Dec. 21, '09, p. 362.
Striation of the Metacarpals and Phalanges in a Case of General Tuberculosis.
Mitchell, **11.** Dec., '09, p. 211.
Synostosis, The Radio-ulnar.
Kienbock (xv 3). May 3, '10, p. 93.
Syphilis of Bone in Roentgen Pictures.
Friedrich, **81** (xii 1). '10.
Tuberculosis, Bone, Importance of Early Recognition of.
Davidson, **53.** July 10, '09, p. 60.
Spina Ventosa and Lupus, Concerning the Combination of.
Rieder, **36** (xv 3). June 2, '10, p. 125.
Bone Sesamoid. See Ossification.
Calcification. See Ossification.

Calculi, Urinary.

Calculi, Progress in the Surgery of. (Read before Western Surgical and Gynecological Assoc., Dec. 20-21, '09.)
Eisendrath abst. **43.** Feb. 19, '10, p. 647.
Calculi, Renal, Diagnosis and Treatment of.
Smith. Read before State Med. Society of Wisconsin.
Report **43.** Aug. 7, '09, p. 480.
Calculus, Ureteral, Diagnosis and Treatment of.
Rigdon, **23.** Nov., '09, p. 388.
Calculi, Renal, Biliary, and Vesical, X-Ray in Diagnosis of.
Childs, **30.** Mar., '10.
Calculi, Renal and Ureteral, The Radiography of. (Thirteen full-page plates.)
Blythell, **50.** Oct., '09, p. 9.
Abst. **11.** Feb., '10, p. 299.
Calculus, Urinary, Value of X-Ray in.
Crawford, **60.** Jan., '10.
Calculus, Ureteral (Clinical Lecture).
Furniss, **69.** April, '10, p. 402.
Calculus of the Ureter.
Fox, **22.** Sept., '09.

Carcinoma.

Carcinoma of the Stomach, Two Cases Diagnosticated by the X-Ray.
Lange, **43.** Mar. 12, '10, p. 873.
Carcinoma of the Stomach, Roentgen Rays in the Diagnosis of.
Pfahler, **61.** Aug. 21, '09, p. 353.
Cancer, Gastric, X-Ray Evidence in.
Crane, **43.** Dec. 11, '09, p. 1962.
Cancer of the Intestines, Diagnosis of. (X-ray part by C. M. Cooper.)
Cheney, **4.** Feb., '09, p. 211.
Constipation, Radiographs of a Boy Aged Three Years, The Subject of Habitual.
Spriggs and Hugo, **20.** April, '10.
Constipation, Investigation of, by the X-Ray.
Herz, **70.** May, '10, p. 705.
Ear and Nose Disease. Diagnostic Importance of Roentgen Examination in.
Jansen **34.** July '09.
Eye, Ear and Throat Diseases. The possibilities of the X-Ray in.
Skinner **46** and **46**a. June, '10

Esophagus.

Joint Diseases.

Lungs and Thorax.

Circulation. Fluoroscopy in Research on the.
Franck and Alwens **59.** May 3, '10, p. 950.
Colon Tube, The, and the High Enema. (Demonstrates usual failure of, also usual success of enema in knee-chest posture, by radiographs.)
Soper **43.** Aug. 7, '09, p. 426.
Colon. The Norman Peristalsis of the.
Holznecht **11.** Feb., '10, p. 273
Esophagus, Stomach, and Intestines. Experiences with Radiography in.
Hurter **12.** (xvi 1-2).
Esophagus. The Routine Examination of the.
Cooper, C. M. **4.** Feb., '10, p. 221.
Gastro-Intestinal Tract, Radiographic Examination of the, from a Practical Standpoint, in connection with Gastro-Enteroptosis.
Pancoast **40.** Series xix, Vol. iii.
Heart, Roentgen Examination of the, in the Carbonic Acid Bath.
Selig **55.** May 1, '10, p. 709.
Heart. Roentgen Localization of the Left Auricle of.
Jaffe **80.** LXVIII 5-6.
Heart and Great Bloodvessels. Orthodiagraphy in the Study of.
Claytor and Merrill **4.** Oct. '09, p. 549.
Hepatic Area, Determination of the, by X-Rays, by Auscultatory Percussion and by Allied Methods.
Benedict **61.** Oct. 2, '09, p. 652.
Internal Organs. Bioroentgenography of. (Stomach and Breathing).
Kaestle, Rieder and Rosenthal **81.** (xii 1).
Abst. **11.** June, '10, p. 3.
Kidneys. Simultaneous Radiography of Both by Means of a Double-Cathode Tube.
Groedel **36.** (xiv 1), Aug. 3, '09.
Abst. **7.** Dec., '09, p. 80.
Kidneys and Ureter. Combined Cystoscopic and Roentgenographic Examination of.
Uhle, Pfahler, MacKinney, and Miller. **8.** Apr., '10, p. 546.
Kidney, Pelvis of, Diagnosis of the Condition of, by Gauging and Radiography.
Voelcker **9.** Vol xc, No. 3, p. 558.
(Kidney) Deformities of the Renal Pelvis. (With 18 plates by Willey).
Braasch **8.** Apr., '10, p. 534.
Lung Apices. Failure of Both to Light Simultaneously on the Fluoroscope.
Bittdorf **36.** (xiv 3), Nov. 12, '09.
Abst., **7.** Mar., '09, p. 146.
Mastoid Radiograms. Stereoscopic, (Technic).
Lange **49.** Apr. '10, p. 437.
Mastoid Region. X-Ray Examination of.
Lange **7.** Dec., '09.
Mastoid Region. Clinical Value of Radiography in.
Iglauer, (Radiographs by Lange) **43.** Sept. 25, '09, p. 1005. **7b** Dec., '09.
Pylorus and Duodenum. A new Method of Catheterizing.
Einhorn. (5 plates by Cole, L G.) **53.** Oct. 9, '09, p. 595.
Skull and Brain. Roentgen Ray Diagnosis of Lesions in.
Schüller **27.** Vol. xii, No. 22-23, Dec. 14, '09, p. 130.
Stomach. Skiagraphy of the,
Rudis-Jacinsky **61.** June 4, '10, p. 1153.
Stomach. X-Ray Examination of.
Lange **65.** Mar., '10.
Stomach. Roentgen Ray Diagnosis of Changes in Position and Shape of.
Schlesinger and Holst **33.** Sept. 2, '09, p. 1509.
Stomach. Roentgen Ray Examination of the Motor Functioning of.
Schlesinger **17.** Feb. 14, '10.
Stomach. Estimation of Secretory Functioning in Roentgen Examination of.
Schlesinger **33.** Apr. 7, '10, p. 657.
Stomach. Roentgen Ray Pictures of the, During the Act of vomiting.
Levy-Dorn and Mühlfelder **17.** Feb. 28, '10.
Teeth. Roentgen Examination of the.
Haenisch **11.** July, '09, p. 37.
(Teeth) Roentgen Rays in Dentistry.
Pfahler **43.** Sept. 4, '09, p. 770.
Ureter. See under Appendix, also Kidney (above).
Urinary System. A Contribution to the Roentgen Diagnosis of the.
Haenisch **36.** (xiv 1). Aug. 30, '09.
Abst. **7.** Dec., '09, p 80
Ureteric Catheter, The Shadowgraph, Value of the in Diagnosis of obscure Lesions of the Urinary Organs.
(Ordinary ureter catheter armed with fuse wire. Plates by Potter.)
Kretchener **73**a, June, '10, p. 598.
Thorax X-Ray Examination of.
Holland **11.** Dec., '09, p. 205.

FRACTURES AND DISLOCATIONS.

FOREIGN BODIES: LOCALIZATION.

GENERAL PRACTITIONER. ARTICLES WRITTEN FOR,

Practitioner, X-Ray for the General.
McClary **61.** July 24, '09, p. 168.
Roentgenologist. The Professional Position of.
Stover **61.** Jan. 1, '10, p. 15.
Roentgenology. Review of.
Boggs **75.** Apr. 22, '10.
X-Ray, What the Physician Who Has No, Should Know about it.
Eberhart **77.** Sept. '09, p. 89.
51. Aug. 25, '09, p. 323.
54. Sept., '09.
57. Sept., '09.
30. Oct., '09.

HOSPITAL AND LABORATORY NOTES.

Bremen. The Roentgen Department of the City Hospital in.
Loose **36.** (xiv 5). Jan. 13, '09, p. 313
Berlin. Roentgenological.
Skinner **7.** Mar., '10, p. 137.
Europe. Notes and Impressions of, (Vienna, Munich, and Zurich.)
Costa **11.** July, '09, (cntd from June, '08) p. 46.
Europe. Notes from Some of the Roentgen Laboratories of.
Pfahler **7.** Dec., '09, p. 15.
X-Ray Work in Hospitals.
Stevens **7.** Mar., '10, p. 107.

INTERPRETATION. ERRORS IN, ETC.

Interpretation, Errors of in Roentgenography.
Imbert **81.** Nov., '09.
Interpretations. Roentgen Ray.
McCurdy **68.** Aug., '09, p. 903.
Interpretations, Wrong, of Roentgen Findings with Calculi in the Urinary Passages.
Roth **55.** Mar. 6, '09, p. 382.
Lung, Hilus Shadow in the Skiagram of the Chest. Anatomical Meaning of.
Fraenkel, E. and Lorey **36.** Nov. 12, '09.
abst. **11.** Feb., '10, p. 288
abst. **7.** Mar., '10, p. 144.
Roentgen Pictures, Concerning.
Alexander **36.** (xiv 6). Feb. 24, '10, p. 424.
Roentgen Shadows. Formula for Computing Actual Size of Organs From.
Geigel **59.** Aug. 10, '09, p. 1646.
Stomach, Misleading Evidences of Radiology of the.
Stille **12.** Vol XVI, No. 2.
Abst **43.** May 2, '10, p. 1729.

MEDICOLEGAL.

Litigation, The Skiagraph in.
Newcomb **29.** July, '09, p. 394.
Medicolegal Aspects of the Roentgen Ray from the Standpoint of the Surgeon.
Mason **76.** Dec., '09.
Testimony, Competency of. Supreme Court of Iowa; State vs Matheson; holds that physician (not the radiographer) present when radiograph was made is competent to testify concerning it.
Reported in **43.** Aug. 21, '09, p. 650.

ORTHODIAGRAPHY.

See also under Examination Technic, etc.

Orthodiagraphy, Concerning the Knowledge of.
de Agostini, **36** (xv 2). May 3, '10, p. 114.
Orthodiagraph, Value of the.
Van Zwaluwenburg, **45.** May, '10, p. 211.

SOCIETIES.

Roentgen Club. (Cincinnati. Organized Aug. 7, '09.)
28. Aug. 14, '09, p. 195.
Roentgen Society, The Sixth Congress of the German. (Detailed report.)
Groedel, **11.** June, '10, p. 31.

THERAPEUTICS OF SPECIAL LESIONS.

Acromegaly, Giantism, Tumors of the Hypophysis; The Radiotherapeutic Treatment of.
Béclère, **11.** Oct., '09, p. 142.
Bronchitis, Chronic and Bronchial Asthma, Roentgen Ray Treatment of.
Schilling, **59.** May 3, '10, p. 956.
Cancer, Treatment of by Radiotherapy and by Radium.
Sequeira, **11.** Aug., '09, p. 75.

Cancer, The X-Ray Treatment of.
Edmondson, **1.** Jan., 1910.
Cancer, X-Rays and.
Jackson, **25.** Aug., 1909, p. 80.
Cancer, Place of the X-Ray in the Treatment of.
Price, **69.** Nov., 1909, p. 117.
Carcinoma of the Breast, Relation of the X-Ray to.
Newcomet, **69.** Nov., 1909, p. 119.
Carcinoma of the Uterus, Preliminary Report on Postoperative Roentgen Irradiation Following the Radical Operation for.
Dachtler.
(Cancer) Roentgen Ray Treatment of Malignant Disease.
Leonard, **6.** Dec., 1909.
Abst. **43.** Jan. 29, 1910, p. 410.
(Cancer) X-Rays in the Treatment of Malignant Disease, with 31 Case Reports.
Iredell, **48.** July 17, 1909, p. 143.
Epithelioma of the Lips and Mouth, The Treatment of.
Pfahler, **3.** Feby., 1910.
Fibroids, Interstitial Uterine, X-Ray Treatment of.
Bordier, **11.** Dec., 1909.
Gastric Ulcer, Treatment of, with Special Reference to Belladonna and the X-Ray.
Bassler, **62.** Sept., 1909, p. 259.
Goitre, The Roentgen Treatment of.
Freund, **11.** June, 1910, p. 13.
Goitre, The Roentgen Treatment of.
Schwarz, **78.** Nov. 25, 1909.
Goitre, The Roentgen Treatment of.
V. Eiselberg, **78.** Nov. 18, 1909.
Abst. **43.** Jan. 1, 1910, p. 89.
Goitre, Exophthalmic, Favorable Influence of the Roentgen Rays on.
Kuchendorf, **33.** May 26, 1910, p. 985.
Goitre, Treatment of Ordinary and Exophthalmic, with Special Reference to the Roentgen Method.
Carl Beck (N. Y.), **7.** Mar., 1910, p. 99.
Gynecology, X-Rays in.
Hasleton, **19.** Aug. 21, 1909, p. 461.
Gynecology, Roentgen Therapy in.
Griscom (9 case reports), Pfahler (Summary and bibliography), **61.** June 25, 1910, p. 1328.
(Gynecology.) Beneficial Influence of Roentgen Rays in Disturbances of the Period and Other Diseases of Women.
Fraenkel (M), **36** Oct., 1909. **11** Mar., 1910, p. 310.
Hypertrichosis, The Failure of Roentgen Ray Treatment of.
Rice, **43.** Jan. 8, 1910, p. 125.
(Hypertrichosis) A Novel Technic for Epilation.
Bordier, **11.** Jan., 1910, p. 260.
Lupus, Treatment of, by Roentgen Rays and Finsen Arc Light.
Frank, **36** (xiv 4). Dec. 12, 21, 1910, p. 264.
Myomata, Roentgen Ray and Operative Treatment of.
Schindler, **33.** Mar. 3, 1910, p. 413.
Nephritis, X-Rays in Chronic.
Lenne, **32.** Aug. 1, 1909, p. 338.
Nevi, Vascular, Roentgen Ray Cure in Two Cases of.
Schmidt, **33.** Dec. 30, 1910, p. 2316.
Pruritis Ani, with Special Reference to Its Treatment by Roentgen Rays.
Le Fevre, **65.** May, 1910.
(Pruritis) Roentgen Ray Treatment of Nervous Itching of the Skin.
Schmidt, **52.** Jan. 19, 1910.
Psoriasis, Value of the Roentgen Ray in the Treatment of.
Richardson, **71.** Nov., 1909, p. 191.
Ringworm, Supposed Risks Attending X-Ray Treatment of.
Cooper (R. H.), **19.** Aug. 21, 1909, p. 454.
Tumors, The Roentgen Treatment of Deep-seated.
Schmidt, **36** (xiv 2). Oct., 1909.
Abst. **7.** Dec., 1909 p. 85.
Tumors, Some Inoperable, Successfully Treated by the X-Ray.
Lawrence, **47.** Aug., 1909.
Thyrolingual Duct, Patent, and Its Affections. (Three cases, use of X-Ray.)
Comroe, **68.** Mar., 1910, p. 430.
Ocular Lesions, Roentgen Ray Flashes for Serious.
Linnell, **38.** Sept., 1909, p. 394.
Thoracic (Intra) Diseases, The Technic of Treatment by Roentgen Rays.
Jessen and Rzewuski, **36** (xiv 6). Feb. 24, 1910, p. 422.
Skin Diseases, X-Ray Therapy in. (Popular summary, five case reports.)
Pond, **37.** Oct., 1909, p. 753.
Skin Diseases and Other Affections, Use of X-Rays in.
Pirie (H.), **48.** Mar. 19, 1910, p. 774.
Long abst., **11.** May, 1910, p. 398.

Tuberculous Cervical Adenitis, The Treatment of by the X-Ray.
Leonard, **43.** May 14, 1910, p. 1596.
Tuberculous Glands of the Neck, Treatment of by the Roentgen Rays.
Davis, **42.** Jan., 1910, p. 17.
Tuberculous Lymph Adenitis, Cervical, and Tuberculous Dermatosis, Treatment of by the X-Ray.
Boggs, **61.** Feb. 19, 1910, p. 380.
Tuberculous Adenitis.
Holding, **2.** Mar., 1910, p. 140.
Tuberculosis, Bone and Joint, Roentgen Treatment of.
Iselin, **34.** Jan., 1910, p. 483.
Tuberculosis, Laryngeal, Treatment of, with Deep Roentgen Ray Exposures.
Wilms, **33.** Feb. 10, 1910, p. 259.
Abst. **43** Mar. 19, 1910, p. 1015.

THERAPEUTIC METHODS AND DOSAGE. PROTECTION OF THE PATIENT.

Dosage, A Standard Notation of X-Ray Tubes for.
Watson, **11.** Jan., '10, p. 255.
Dosage, The Question of.
Christen, **36** (xv 1). Mar. 31, 1910, p. 31.
Dosage Measure, Researches Concerning the Importance of Roentgen Ray Quality for the Direct.
Schmidt, **36.** (xv 1). Mar. 31, 1910, p. 38.
Dosimeter, The Milliamperemeter as a.
Walter, **36** (xiv 5). Jan. 18, 1910, p. 342.
Dosage of Roentgen Rays by Photographic Technic in Daylight.
Strauss, **33.** Mar. 3, 1910, p. 414.
Dosage, Roentgen Ray, Improved Means of.
Schwarz, **59.** Dec. 14, '09, p. 2578.
Abst. **43.** Jan. 22, 1910, p. 331.
Dose, Measurement of the Erythema by the Milliammeter.
Walter, **36** (xiv 2). Oct. 30, 1909.
Abst. **11.** Jan., 1910, p. 239.
Dosimetrically Gauged Tubes, X-Ray Therapy with.
Schmidt, **69.** April, 1910, p. 374.
Filter, Role of the, in Radiotherapy.
Bordier, **11.** Mar., 1910, p. 315.
Intermittent X-Rays, Action of, on General Metabolism and Chronic Degenerative Changes of the Eye.
Cook, **53.** May 7, 1910, p. 779.
Radiotherapy. (General, with case reports.)
Van Allen, **2.** Mar., 1910, p. 151.
Radiotherapy. (Very general summary.)
Dickson, **24.** Sept., 1909, p. 30.
Roentgen Therapy, The Principles of.
Tousey, **61.** Apr. 16, 1910, p. 807.
Roentgen Treatment, Massive Dose. (By use of the iron wire screen.)
Kohler, **59.** Nov. 9, 1909, p. 2314.
Abst. **43.** Jan. 1, 1910, p. 89.
Roentgen Therapy, with Short Exposure.
Schmidt, **36** (xiv 4). Dec. 21, 1910, p. 265.
Roentgen Therapy, Rapid.
Albers-Schonberg, **36** (xiv 2). Oct. 30, 1909.
11. Dec., 1909, p. 204.
Roentgen Therapy, Deep, without Injury to the Skin.
Kohler, **36** (xiv 1). Aug. 30, 1909.
11. Oct., 1909, p. 141.
Abst. **7.** Dec., 1909, p. 82.
Roentgen Therapy without the Production of Dermatitis.
Geyser, **62.** Oct., 1909, p. 289.
Skin, the, An Apparatus for Rendering Less Sensitive (by Compression) during Deep Irradiation.
Schmidt, **36** (xv 2). May 3, 1910, p. 117.
Therapeutic Applications of the X-Rays. (Exhaustive bibliography of 34 pages.)
Bachem, **36** (xiv 4). Aug. 30, 1909.
Therapeutic Reaction to the X-Rays, The Early.
Schmidt, **33.** June 9, 1910.
X-Ray Treatment, Therapeutic Facts from Observations of.
Mick, **42.** April, 1910.

FOCUS TUBES AND INVESTIGATIONS OF.

Tube, The Puncture of a Vacuum.
Knipers, **11.** Nov., 1909, p. 188.
Tube, Regeneration of the Focus.
Beckett, **11.** Oct., 1909, p. 150.
Tube, A Modified "Cornell" X-Ray.
Sutton, **43.** July 3, 1909, p. 29.

Transparency of Matter for X-Rays not Affected by Transverse Radiation from a Second Tube. (Contradiction to claim of O'Donnel in **43.** Apr. 17, 1909).
Millikan and Moore, **43.** Sept. 25, 1909, p. 1026.
Roentgen Rays, Distribution of from a Focus Bulb.
Kaye, **11.** May, 1910, p. 381.
Roentgen Rays, Emission and Transmission of.
Kaye, **11.** July, 1909, p. 55. Aug., 1909, p. 81. Sept., 1909, p. 110.

MISCELLANEOUS.

American Pediatric Society, Position and Work of Toward Public Questions. (Takes up author's studies in the "Anatomic Age of the Child.")
Rotch, **15.** Oct., 1909, p. 721.
Bromide Paper, Production of Radiographs on, without an Intensifying Screen.
Kronecker, **55.** Jan. 23, 1910, p. 143.
Ether Anesthesia, Contraindication for in Roentgen Work.
Krunkenberg, **59.** Jan. 25, 1910, p. 192.
Abst. **11.** May 1910, p. 401.
Diphtheria Toxin and Roentgen Rays. (Laboratory experiments show destruction of the toxin.)
Gerhartz, **17.** Oct. 4, 1909, p. 1800.
Abst. **43.** Nov. 13, 1909, p. 1699.
Lantern Slides, Stereoscopic Roentgen.
Levy-Dorn, **17.** Aug. 2, 1909, p. 1459.
Speed Mania.
Cole, L. G., **7.** Mar., 1910, p. 119.
Temperature, Some Influences of in Photography.
Leaming, **7.** Mar., 1910, p. 116.
X-Rays, A Victim of the. (Condition of H. W. Cox.)
London Letter, **43.** Feb. 12, 1910, p. 547.

BOOKS PUBLISHED IN 1909-1910.

Arthritis Deformans, Comprising Rheumatoid Arthritis, Osteoarthritis and Spondylitis Deformans.
R. Llewellyn Jones. Cloth; pp., 353; $4.00. Wm. Wood & Co., N. Y.
Rev'd 11, Oct., 1909, pp. 159.
Atlas der Anatomie des Mediastinums im Rontgenbilde.
Friedrich A. Hoffman, Leipzig. 25 radiographic plates; 12 marks. Dr. Werner Klinkhardt, Leipzig.
Diseases of the Bones and Joints.
Goldthwaite, Painter and Osgood, Boston. Cloth; pp., 685; illustrated; $6.00. Wm. M. Leonard, Boston.
Dermatologie, Die Rontgentherapie in der.
Dr. Frank Schultz. Paper; pp., 143; 130 illustrations; 6 marks. Julius Springer, Berlin.
Fractures and Dislocations, a Practical Treatise on.
Lewis A. Stimson, New York. Cloth; pp., 876; 426 illustrations. Lea & Febiger, Philadelphia.
Handbuch der gesamten medizinischen Anwendung der Elektrizitat einschlieslich der Rontgenlehre.
H. Borntau and L. Mann. Band I paper; pp., 599; illustrated. Dr. Werner Klinkhardt, Leipzig.
Medical Annual, The International.
Cloth; pp., 762; $3.50. E. B. Treat & Co., New York.
Medical Electricity and Radiography, The Essentials of.
E. Reginald Morton. Pp., 343; 140 illustrations; $1.75. Chicago Medical Book Co.
Medical Electricity and Roentgen Rays.
Sinclair Tousey, New York. Cloth; pp., 1116; 750 illustrations; $7.00. W. B. Saunders Co., Philadelphia.
Pediatrics, The Roentgen Ray in, Living Anatomy and Pathology. Diagnosis of Disease in Early Life by the Roentgen Method.
T. M. Rotch, Boston. Cloth; $6.00. J. B. Lippincott & Co., Philadelphia.
Practical Points in the Use of the X-Ray and High Frequency Currents.
Aspinwall Judd, New York. Cloth; pp., 189; $1.50. Rebman & Co., N. Y.
Rev'd 43, Apr. 9, 1910; p. 1232.
Practical X-Ray Therapy.
Noble M. Eberhardt, 2nd Ed. Cloth; pp., 250; $1.50. Chicago Medical Book Co.
Rev'd 43, May 7, 1910; p., 1574.
Orthopedic Surgery for Practitioners.
Henry Ling Taylor, New York, assisted by Chas. Ogilvy and F. H. Albee. Cloth; pp., 503; $5.00. D. Appleton & Co., N. Y.
Rev'd 43, July 17, 1909; p., 221.
Rachitis im Rontgenbilde, Die. (Erganzungsband No. 22 der Fortschritte, etc.)
Dr. Eug. Fraenkel and Dr. Alex. Lorey, Hamburg. 12 plates, containing 42 reproductions; 11 marks. Lucas Grafe & Sillem, Hamburg.

Radioactivity, An Introduction to the Science of
Chas. W. Rafferty. Cloth; pp., 208.; illu trated; $1.25. Longmans, Green & Co., N. Y.
Rontgen Taschenbuch, Band II.
Ernst Sommer. Cloth; 3 marks. Rev'd 11, Oct., 1909; p., 159. Otto Nemnich, Leipzig.
Sprains and Allied Injuries to Joints.
R. H. Anglin Whitlocke. Cloth; pp., 241; 65 illustrations; $3.00. Oxford University Press.
Surgical Diagnosis.
Edward Martin. (Roentgen section by H. K. Pancoast.) Cloth; pp., 737; 445 engravings, 18 plates; $5.50. Lea & Febiger, Philadelphia.
Tuberculosis. Roentgen Atlas of Lung.
Ziegler and Krause. 40 marks. Curt Kabilsch, Wurzburg.
Rev'd, 36 (xiv 6). Feb. 21, 1910; p., 445.
Tuberculosis, Pulmonary, and Its Complications, with Special Reference to Diagnosis and Treatment.
Sherman G. Bonney. Cloth; p., 955; 243 illustrations; $7.00. W. B. Saunders Co., Philadelphia.
Verletzungen des Ellenbogengelenks in Röntgogramm mit besonderer Berucksichtigung der Frakturen des unteren Humerusendes.
Dr. E. Wendt, Halle. 18 plates, with 179 reproductions; 17 marks. Erganzungsband No. 23 der Fortschritte, etc. Lucas Grafe & Sillem, Hamburg.

DIRECTORY OF PERIODICALS

1 Alabama Medical Journal. Birmingham.
2 Albany Medical Annals. Albany, N. Y.
3 American Journal of Dermatology. St. Louis.
4 American Journal of the Medical Sciences. Philadelphia.
5 American Journal of Orthopedic Surgery. Philadelphia.
6 American Journal of Surgery. New York.
7 American Quarterly of Roentgenology. Detroit, Mich.
7b Annals of Otology, Rhinology and Laryngology. St. Louis.
8 Annals of Surgery. Philadelphia.
9 Archiv fur Klin. Chirurgie. Berlin.
10 Archiv fur Physik, Medizin und Med. Technik.
11 Archives of the Roentgen Ray. London.
12 Archiv fur Verdauungs-Krankheiten. Berlin.
13 Archives of Diagnosis. New York.
14 Archives of Ophthalmology. New York.
15 Archives of Pediatrics. New York.
16 Beitrage zur Klin. Chirurgie. Tubingen.
17 Berliner Klinische Wochenschrift.
18 Boston Medical and Surgical Journal.
19 British Medical Journal. London.
20 British Journal of Children's Diseases. London.
21 Bulletin of Johns Hopkins Hospital. Baltimore.
22 Bulletin of Northwestern University Med. School. Chicago.
23 California State Journal of Medicine. San Francisco.
24 Canada Lancet. Toronto.
25 Canadian Journal of Medicine and Surgery. Toronto.
26 Centralblatt fur Chirurgie. Breslau.
27 Centralblatt fur d. Grenzgebiete der Medizin und Chirurgie. Jena.
28 Cincinnati Lancet-Clinic.
29 Cleveland Medical Journal.
30 Denver Med. Times and Utah Med. Journal. Denver.
31 Detroit Medical Journal.
32 Deutsche Aertze-Zeitung. Berlin.
33 Deutsche Medizinische Wochenschrift. Berlin.
34 Deutsche Zeitschrift fur Chirurgie. Leipsic.
36 Fortschritte auf der Gebiete dem Rontgenstrahlen. Hamburg.
37 Hahnemannian Monthly. Philadelphia.
38 Homeopathic Eye, Ear and Throat Journal. New York.
39 Illinois Medical Journal. Springfield.
40 International Clinics. Philadelphia.
41 Iowa Medical Journal. Des Moines.
42 Journal of Advanced Therapeutics. New York.
43 Journal of The American Medical Association. Chicago.
44 Journal of Medical Research. Boston.
45 Journal of Michigan State Med. Society. Detroit.
46 Journal of Missouri State Med. Association. St. Louis.
46a Journal of Ophthalmology and Otolaryngology. Chicago.
47 Journal of Tennessee State Medical Association. Nashville.
48 Lancet. London.
49 Laryngoscope. St. Louis.
50 Medical Chronicle. Manchester, Eng.
51 Medical Fortnightly. St. Louis.
52 Medical Press and Circular. London.
53 Medical Record. New York.

DIRECTORY OF AUTHORS

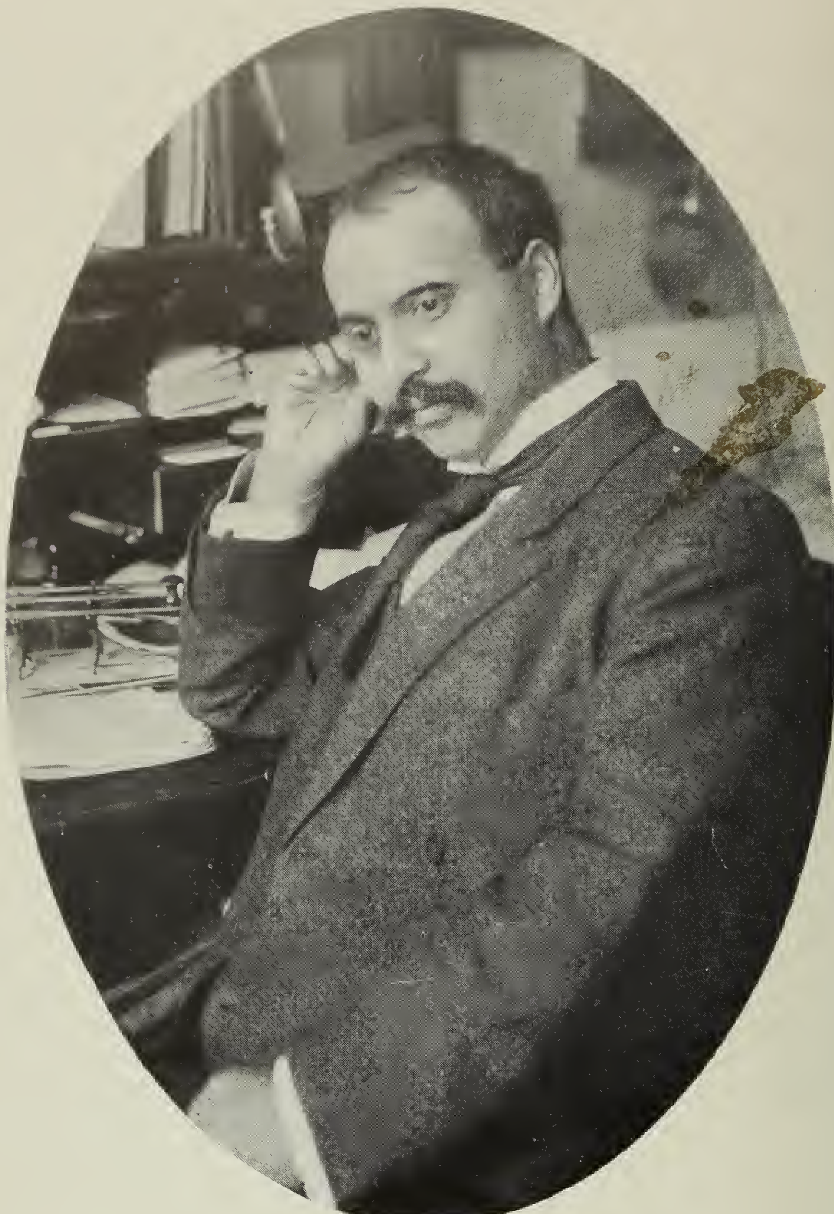
In this section an effort has been made to give the address of each writer sufficiently complete to facilitate correspondence. No attempt is made to include even well known workers who have no articles listed in the accompanying Index. In a few instances, mostly German, the complete address could not be verified in time to include it in this list. (D. R. B.)

Adler, Dr. Harry, 1804 Madison Ave., Baltimore.
Algyogyi, Dr. Herman, Vienna.
Albers-Schönberg, Dr., Hamburg.
Alexander, Dr. Bela, Budapest.
Allen, Samuel J., Cincinnati.
Alwens, Dr. W., Frankfurt a. Main.
Anderson, Dr. A. B., Pawnee City, Neb.
Ashbury, Dr. Howard E., 1029 Cathedral St., Baltimore.
Bachem, Dr. Max, Frankfurt a. Main.
Bacher, Dr. R., Olmütz. Germany.
Barling, Dr. G., Birmingham, Eng.
Bassler, Dr. Anthony, 126 E. 60th St., New York.
Beck, Dr. Carl, 92 State St., Chicago.
Beck, Dr. Carl, 37 E. 31st. St., New York.
Beck, Dr. Emil G., 92 State St., Chicago.
Becker, Dr. P. F., Germany.
Beckett, Dr. T. G., Melbourne, Australia.
Béclère, Dr. A., Paris.
Beez, Dr. Carl, Berlin.
Behn, Dr. D., Kiel, Germany.
Benedict, Dr. A. L., 354 Franklin St., Buffalo.
Bittdorf, Dr. A., Breslau, Germany.
Blythell, Dr. W. J. S., Manchester, Eng.

Blanchard, Dr. Wallace, 34 Washington St., Chicago.
Boggs, Dr. Russell H., Empire Bld'g, Pittsburg.
Bordier, Dr. H., Lyons, France.
Bowen, Dr. David R., Rome, N. Y.
Braasch, Dr. W. F., Rochester, Minn.
Bradford, Dr. E. H., 133 Newbury St., Boston.
Brown, Dr. John Young, Metropolitan Bld'g, St. Louis.
Bruce, Dr. E. T., Louisville, Ky.
Buerger, Dr. Leo, 63 e. 90th St., New York.
Burkhardt, Dr. L., Arosa, Germany.
Caldwell, Dr. E. W., 480 Park Ave., New York.
Carman, Dr. R. D., 4318 Olive St., St. Louis.
Chene, Dr. Geo. C., Detroit.
Cheney, Dr. W. F., San Francisco.
Chilaiditi, Demetrius, Vienna.
Childs, Dr. S. B., Denver.
Christen, Dr. Th., Bern, Switzerland.
Clark, Dr. F. H., El Reno, Oklahoma.
Claytor, Dr. Thos. A., 1315 New Hampshire Ave., Washington, D. C.
Cohn, Max, Berlin.
Cole, Dr. Jas. J., 5658 State St., Chicago.
Cole, Dr. Louis Gregory, 103 Park Ave., New York.
Conroe, Dr. J. H., York, Pa.
Cook, Dr. Finley R., 120 E. 34th St., New York.
Cooper, Dr. Chas. M., San Francisco, Butler B'ldg.
Cooper, R. Higham, London.
Coover, Dr. D. H., Denver.
Corson, Dr. E. R., Savannah, Ga.
Coues, Dr. Wm. Pearce, 261 Beacon St., Boston.
Crane, Dr. A. W., Kalamazoo, Mich.
Crawford, Dr. L. B., 741 Carondelet St., New Orleans.
Cushway, Dr. Bertram C., 34 Washington St., Chicago.
Dachtler, H. W., Toledo, Ohio.
David, Dr. Vernon C., 72 E. Madison St., Chicago.
Davidson, Arthur J., 200 S. 12th St., Philadelphia.
Davis, Dr. Frank A., Hotel Huckminster, Boston.
de Agostina, P., Pavia, Italy.
Denck, P., Germany.
Denks, H. G. R., Germany (?).
Dessauer, Friedrich, Aschaffenburg, Germany.
de Schweinitz, Dr. Geo. E., 1705 Walnut St., Philadelphia.
Dickson, Dr. C. R., Toronto, Can.
Dietlen, Hans, Strasburg, Germany.
Eastmond, Dr. Chas., 382 Adelphi St., Brooklyn.
Eberhardt, Dr. Noble M., 72 Madison St., Chicago.
Edmondson, Dr. J. H., Birmingham, Ala.
Einhorn, Dr. Max, E. 63rd St., New York.
Eisendrath, Dr. Daniel N., 183 State St., Chicago.
Ely, Dr. Leonard W., 201 W. 55th St., New York.
Fenwick, E. Hurry, London.
Florecky, H., Germany.
Forsell, Dr. Gosta, Stockholm, Sweden.
Fox, Dr. Chas. M., 103 State St., Chicago.
Fraenkel, Dr. Eug., Hamburg.
Fraenkel, Dr. Manfred, Charlottenburg, Germany.
Francine, Dr. Albert P., 218 S. 17th St., Philadelphia.
Franck, O., Mainz, Germany.
Friedrich, Dr., Marburg, Germany.
Freund, Dr. Leopold, Vienna.
Furniss, Dr. Henry D., West End Ave. & 79th St., New York.
Fussell, Dr. M. Howard, 421 Lyceum Ave., Roxborough, Philadelphia.
Geigel, Dr. R., Wurzburg, Germany.
Gerhartz, Dr. H., Berlin, Germany.
Germain, Dr. Harry H., 416 Marlboro St., Boston.
Geyser, Dr. A. C., 158 West 76th St., New York.
Granger, Dr. Amedee, Perrin Building, New Orleans.
Gray, Dr. A. L., Richmond, Va.
Groedel, Dr. F. M., Bad Nauheim, Germany.
Griscom, Dr. Mary W., 253 S. 17th St., Philadelphia.
Haenisch, Dr. G. Fedor, Hamburg.
Hall-Edwards, Dr. John, Birmingham, Eng.
Hastings, Dr. S., England.
Hawley, Dr. G. W., Bridgeport, Conn.
Hazleton, Dr. E. B., Sheffield, Eng.
Hecht, D'Orsay, Dr., 103 State St., Chicago.
Herz, Dr. A. F., London.
Hickey, Dr. Preston M., Detroit, Mich.
Hoke, Dr. Michael, Atlanta, Ga.
Holding, Dr. Arthur, Albany, N. Y.

Holland, Dr. C. Thurstan, Liverpool, Eng.
Holznecht, Dr. Guido, Vienna.
Hurter, Dr. J., Germany.
Iglauer, Dr. Samuel, 22 W. 7th St., Cincinnati.
Imbert, Dr. A., Montpellier, France.
Iredell, Dr. C. E., London.
Iselin, Dr. Hans, Germany.
Jaches, Dr. Leopold, 11 E. 48th St., New York.
Jackson, Dr. Chevalier, 428 Park Building, Pittsburg.
Jacobi, Dr. J., Germany.
Jacobson, Dr. E., Germany.
Jaffe, Dr. L., Germany.
Janowsky, Dr., St. Petersburg.
Jansen, Dr., Berlin.
Janus, Dr. Friedrich, Erlangen, Ger.
Jessen, F., Davos.
Jonas, Dr. S., Vienna.
Jones, Dr. Robert, Liverpool, Eng.
Jordan, Dr. A. C., London.
Kaestle, C., Munich.
Kaufman, Dr. J. R., Cook Co. Hospital, Chicago.
Kaye, Dr. G. W., Teddington, England.
Kienbock, Dr. Robt., Vienna.
Kleinberger, Dr. C., Königsberg, Germany.
Kohler, Dr. Alban, Wiesbaden, Germany.
Knipers, Dr. A., Deventer, Holland.
Knox, Dr. Robt., London.
Koch, Dr., Dresden.
Krause, Dr. Paul, Bonn, Prussia.
Kretschner, Dr. Herman L., 42 Madison St., Chicago.
Kronecker, Dr. F., Berlin.
Krunkenberg, Dr. K., Elberfeld.
Kuchendorf, Dr. D., Posen, Prussia.
Lane, Dr. W. A., England.
Lange, Dr. Sidney, 22 W. 7th St., Cincinnati.
Lawrence, Dr. W. L., Memphis, Tenn.
Leaming, Dr. Edward, 11 E. 48th St., New York.
Legg, Dr. Arthur T., Charlesgate Hotel, Boston.
LeFever, Dr. W. I., Cleveland, O.
Leonard, Dr. Chas. Lester, 112 S. 20th, Philadelphia.
Levy-Dorn, Dr. Max, Berlin.
Linnell, Dr. E. H., Norwich, Conn.
Loose, Dr. Gustav, Bremen.
Lorey, Dr. Alex., Hamburg.
Maelske, Dr., Seidenberg, O. L.
Mainwaring-White, Dr. R., Northwich, Eng.
Mason, Dr. R. D., Omaha, Neb.
McClary, Dr. Sam'l, 308 S. 52nd St., Philadelphia.
McCombs, Dr. Robt. S., 130 S. 22nd St., Philadelphia.
MacKinney, Dr. W. H., 1831 Chestnut St., Philadelphia.
Merrill, Dr. Walter H., 1913 14th St., N. W., Washington, D. C.
Metcalfe, Dr. J., England.
Mick, W. H., Dr., Omaha, Neb.
Minor, Dr. C. L., Asheville, N. C.
Miller, Dr Albert G., 778 Drexel Building, Philadelphia.
Millikan, R. A., Chicago.
Mitchel, Dr. W., Bradford, Eng.
Mixter, Dr. Samuel J., 180 Marlboro St., Boston.
Mollow, Dr. W., Sofia, Bulgaria.
Moore, E. J., Chicago.
Morton, Reginald, Dr., London.
Müller, C., Immerstadt, Germany.
Nelson, Dr. H. R., Victoria, B. C.
Newcomb, Dr. R. B., Cleveland, O.
Newcomet, Dr W. S., 3501 Baring St., Philadelphia.
Otten, M., Tubingen, Germany.
Pancoast, Dr. Henry K., 4238 Pine St., Philadelphia.
Pfahler, Dr. Geo. E., 1321 Spruce St., Philadelphia.
Pedersen, Dr. James, 20 E. 46th St., New York.
Pförrenger, Dr., Regensberg, Germany.
Pilcher, Dr. Lewis S., 386 Grand Ave., Brooklyn.
Pirie, Dr. G. A., Edinburgh, Scotland.
Pirie, Dr. Howard, London.
Pond, Dr. Edward H., 403 Life Trust Building, Pittsburg.
Porter, Dr. Chas. A., 254 Beacon St., Boston.
Price, Dr. J. C., Scranton, Pa.
Putti, Dr V., Bologna, Italy.
Rammstadt, Dr., Munster, Germany.
Redlich, Dr. E., Vienna.

Reichman, Dr. Max, 109 E. Randolph St., Chicago.
Richardson, Dr. D. L., Providence, R. I.
Rieder, Dr. H., Munich.
Ridlon, Dr. John, 72 Madison St., Chicago.
Rigdon, Dr. R. L., San Francisco.
Rosenthal, Josef, Munich.
Rosler, Dr. Alfred, Leipzig.
Ross, Dr. G. W., Port Ewen, N. Y.
Rotch, Dr. Thomas M., 197 Commonwealth Ave., Boston.
Rotky, Hans, Prague, Austria.
Roth, Dr. M., Berlin.
Rowntree, Dr. Cecil W., London.
Rudis-Jacinsky, Dr. J., Cedar Rapids, Ia.
Ryerson, Dr. E. W., 743 Lincoln Park Block, Chicago.
Rzewuski, Dr. A., Davos.
Savill, Dr. Agnes F., London.
Sawyer, Dr. C. F., 42 Madison St., Chicago.
Selig, Dr. A., Franzensbad, Germany.
Schilling, Dr. F., Nurnburg, Germany.
Schindler, Görlitz, Germany.
Schlessinger, Dr. Emmo, Berlin.
Schmidt, Dr. H. E., Berlin.
Schumm, Dr. O., Hamburg.
Schwarz, Dr. Gottwald, Vienna.
Schüller, Dr. A., Vienna.
Sequira, Dr. Jas. H., London.
Sjögren, Dr. T., Stockholm, Sweden.
Simon, Dr. M., Stockholm, Sweden.
Simmonds, Dr. M., Hamburg.
Simmons, Dr. Channing C., 66 Beacon St., Boston.
Skinner, Dr. Edw. H., Kansas City.
Smith, Dr. J. F., Wassau, Wis.
Soiland, Dr. A., Los Angeles.
Soper, Dr. Horace W., Metropolitan Building, St. Louis.
Spriggs, Dr. E. I., England.
Stern, Dr. Walter G., Cleveland, O.
Stevens, Dr. Rollin H., Detroit.
Stiller, Dr. B., Budapest.
Stover, Dr. G. H., Denver.
Strauss, Dr. A., Barmen, Prussia.
Sweet, Dr. Wm. M., 1205 Spruce St., Philadelphia.
Swett, Dr. Paul P., Hartford, Ct.
Talley, Dr. D. D., Richmond, Va.
Thomas, Dr. W. S., 240 W. 71st St., New York.
Tousey, Dr. Sinclair, 59 W. 46th St., New York.
Thieman, Dr. T., Jena, Germany.
Trappe, Dr. Max, Breslau, Germany.
Tyson, Dr. Wilson, England.
Uhle, Dr. Alexander, 602 Professional Building, Philadelphia.
Van Allen, Dr. H. W., Springfield, Mass.
VanZwaluwenberg, Dr. J. G., Ann Arbor, Mich.
Villard, Dr. P., Paris.
Voelcker, Dr. F., Heidelberg, Germany.
von Dehn, Dr. O., Greiffenhagen, Germany.
vonEiselberg, Dr. A., Germany.
Walter, Dr. B., Hamburg, Germany.
Watkins, Dr. J. F., San Francisco.
Wilson, Dr. J. T., Sidney.
Wiesner, B., Aschaffenberg, Germany.
Wilms, Dr. M., Basel, Switzerland.
Wohlbach, Dr. S. B., Montreal.



DR. MIHRAN KRIKOR KASSABIAN

The American Quarterly of Roentgenology

Edited by P. M. Hickey, M. D.

Vol. II DECEMBER, 1910 No. 4

SERIOUS MENTAL DISTURBANCES CAUSED BY PAINLESS DENTAL LESIONS.

BY HENRY S. UPSON, M. D.

Member of the American Neurological and American Medico-Psychological Associations; Professor of Neurology in the Western Reserve Medical School, Cleveland.

In the skiagraphic study of the teeth and jaws there are involved, in addition to the common superficial lesions, many which lie deeper. These lesions cannot be detected without the aid of the X-rays. The most important are impactions which have prevented eruption, abscesses at or near the roots, exostosis, now called by the dentists pericementosis, and pulp nodules. To these may be added extensive caries, especially when under fillings, and large fillings in contact with or near the pulp. These conditions are often though not always painless. A study of their relations with various nervous and mental conditions extending over almost four years has shown me that they are often disastrous to nervous and mental health. Cases unaccompanied by pain acquire an especial importance from the fact that their origin is usually unrecognized.

The following cases are selected to show a fairly wide range of dental lesions. The importance of their full and early recognition and complete removal is shown by a study of the attendant symptoms, the cases including, as they do, some of the most severe and intractable forms of the psychoses.

The first case is not one of insanity, but an instance of a whimsical mental aberration which, recognized as such by the patient, seems even less real and less reasonable than do the better known forms of delirium and delusion. The patient was nineteen years old, prepossessing in appearance, of good color and physique. She had been well until the beginning of this illness. The only deviation from the normal which had ever been noticed about her was that when twelve years old she was for a time unwilling to make a positive statement. She would say, "I think so" and "I believe so." This lasted for some months and then passed off. Two or three years ago she began to have a fear that she was contaminated. This gradually increased until she spent the greater part of the day washing herself and objects with which she came in contact, such as door-knobs and household utensils. She then spent a winter in California. While there she heard a great deal about tuberculosis, and transferred her delusion to a dread of consumption. She did not fear for herself, but was afraid that she was spreading the germs. She came back in perfect physical health, robust looking, sleeping and eating well. Her mental state, however, caused herself and her family great misery. She had no pain anywhere, except occasional mild frontal headaches. She never in her life had toothache or dizziness.

Inspection of the mouth showed an unusually fine dentition. The third molars, however, were absent. Skiagraphs taken at the time of the first examination in June, 1909, showed them unerupted and still in the jaws, the lower ones impacted and angled against the second molars. (Figs. 1 and 2.) The upper third molars were not angled but were badly crowded. All of the third molar teeth were extracted at that time.

For a month following the operation the patient was in the same condition. Then improvement began and was progressive. She entered college in the autumn, made a good record

there, and at the last report, fourteen months after the operation, was well and in good spirits.

This is a classical instance of a sufficiently common type of mental disorder, obsession, in the disease called by Janet psychasthenia. An absolutely pure local irritation without toxic action was the cause of as near an approach to the simple delusion as is ever found in mental alienation; but while the patient gave expression to a false idea, which she recognized as a delusion, a short experience with her sufficed to show that she was constantly worried, and this emotion was so overpowering as without doubt to warp the quality of her thought.

So simple a lesion, with so definite a result, is not common. More often both lesions and resultant symptoms are complicated, as in the following instance.

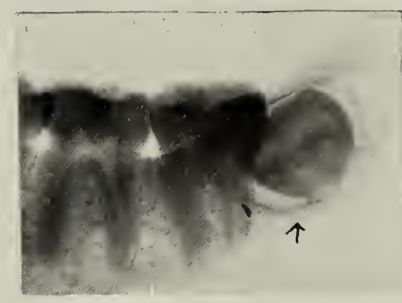
Case two was a woman twenty-seven years old, for many years nervous, who had had a definite mental breakdown on several occasions, each time having the same delusion. She had a morbid fear of a child whom she knew at school, but had not seen for a long time. She worried constantly about this matter, whose triviality she fully realized. She also had various doubts and uncertainties, went back to see if she had closed the door, and other things of like kind. She was sleepless and looked haggard and worn. There was no headache, but a heavy feeling at the nape of the neck. She had had no toothache or earache for many years. General physical examination gave an entirely negative result. On skiagraphic examination a lower second molar tooth was found impacted against the second bicuspid, the first molar having been removed in childhood. (Fig. 3.) This tooth was extracted in October, 1909. Two bicuspid teeth in the upper jaw showed marked abscesses at the root and were extracted a week later. (Fig. 4.) A month afterward the patient insisted that she was no better in any way. An examination, however, showed that her color was better, her face looked plumper, and while she expressed herself as discouraged, her talk was distinctly less dismal than it had been. From this time her improvement was progressive, and ten weeks after the operation she was

entirely well. Her appetite was good and she was cheerful and in a normal mental state. She has remained so ever since.

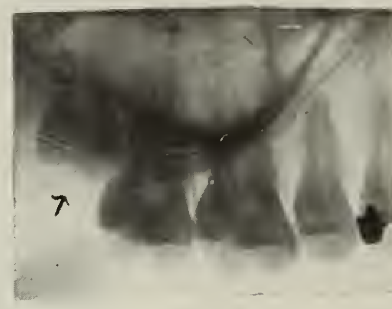
The sequence of events after the operation was in this case typical of what happens when irritation causes both mental and physical symptoms. Physical improvement is noticeable early, and somewhat later mental gain begins, the two then going on together. Emotional symptoms clear up first. Delusions persist until after the emotional substratum has disappeared.

The third case presents an example of a psychosis at once more severe and more complex. The patient was a man 55 years of age, large, fleshy and rather pale, and was first seen in December, 1908. He had met with a severe personal bereavement twelve years before, and began to be nervous and sensitive. He was mentally affected from that time on, with periods of insomnia and melancholy, during which he cried readily, was easily fatigued and irritable, and waked in the early morning with apprehensions of indefinite ills. He suffered much from flatulence and sour stomach, and his most constant apprehension was that he had a growth or an animal in the stomach. Several consultants assured him after thorough examination that there was no serious organic disease, and ordered the usual palliative measures. Physical examination gave negative results. There remained in his jaws only seven upper teeth, and one lower one, all of them in an advanced stage of pyorrhea. The gums were eaten into by deep suppurating ulcers. On skiagraphic examination extensive alveolar abscesses were found. (Figs. 5 and 6.) These conditions are so bad that it seems as if they must be exceptional. Caps on abscessed teeth, and bridges over rivers and stagnant pools of pus make a not very creditable showing for the dentist who did the work. Unfortunately such conditions are common, on account of the neglect of the teeth by the majority of the population, and the neglect of skiagraphic diagnosis by dentists and physicians.

There had been no headache or other pain except a moderate aching in one of the teeth. No connection had been noted between these occasional toothaches and the other symptoms. Extraction of all the teeth was recommended and promptly



NO. 1



NO. 2

NO. 3

NO 4

NO. 5

NO. 6

carried out. The patient began to feel better within a few days, and since then has slept well, has recovered from his delusions, and has been able to attend to his usual business without interruption. Occasional attacks of indigestion remain. It is unfortunately impossible to remove the organic results of irritation and septic poisoning on the abdominal and other viscera after a duration of so many years. In this sense complete recovery is not to be attained in such cases. The improvement is such as might be expected from the removal of the main causative factor.

In making a diagnosis in the preceding case it is useless to attempt to draw any lines between neurasthenia, psychasthenia and melancholia. The patient presented well-marked symptoms of all these conditions, and a diagnosis of each would be fully warranted if the symptoms of the other two had been absent. The doubts and obsessions of the psychasthenic, the fatigue and nervousness of the neurasthenic, and depression of the melancholic were present in about equal degree.

In the fourth patient emotional disturbances were even more severe, her melancholia being associated with profound delusions, and mental control and insight practically lost. The patient was a well-nourished woman of about 40, not anemic, but of pasty color. She was first seen in October, 1909. She had then been in an asylum for some months. She had always been rather nervous, but otherwise well until eight months before. She then began to have delusions, that she had valuable papers, and that detectives were watching her to get them, that her relatives were conspiring against her, that her umbilicus was inhabited by her mother's soul, and many other insane ideas. She was constantly haunted by the thought that everything that happened to her had already taken place, and that her conversations were duplicates of former ones. She was excitable, talked volubly, cried readily and almost incessantly, and thought that she had been abused by various people. Examination gave negative results except in the maxillary and pelvic regions. It was found by skiagraph that the right lower second bicuspid and first and second molar teeth were dead and

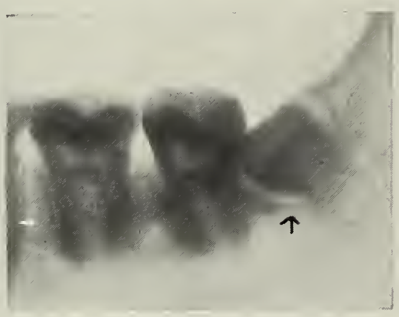
irritated at the root; the right upper lateral incisor had a large abscess at the root, the upper left second bicuspid and first molar were badly decayed; the upper second molar looked as if it might possibly contain a pulp nodule; the left lower first bicuspid was dead and not filled to the end of the root. (Figs. 7 and 8.) These with the useless right third molar were extracted. The left upper second molar was found to contain no pulp nodule; otherwise the findings corresponded with the skiagraphic indications. Following the extraction mental improvement began and was steady for two and a half weeks. The uterus and ovaries were then extirpated by Dr. W. H. Humiston. The uterus was large and hard, and firmly bound down by adhesions. Both ovaries were sclerotic and cystic. Following the operation there was an immediate cessation of the crying, and the patient was cheerful and gave expression to no delusions. Lobar pneumonia developed on the second day after the operation. The patient, however, recovered from the pneumonia and gained steadily in strength and physical health and in emotional stability. She is now well and strong physically and mentally.

In this patient in addition to symptoms of melancholia and psychasthenia mental failure was sufficiently marked to suggest a probability of beginning dementia. The case was one of many in which the mixture of mental symptoms makes it necessary to determine the diagnosis by prolonged observation, in this instance fortunately cut short by her recovery. I am disposed to attribute greater importance to the pelvic than to the dental conditions in this case, but neglect of either would have probably resulted in therapeutic failure.

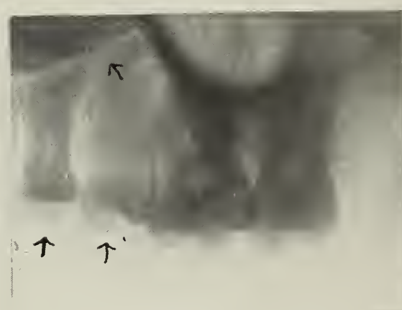
Many cases of functional insanity occurring during the period of adolescence end in dementia. These unfortunates constitute the majority of the life-long residents of our asylums. They may conveniently be called cases of adolescent insanity, or by the less familiar term coined by Kraepelin, dementia precox. The symptoms vary widely, including first and last almost the whole gamut of mental and moral aberration. The condition represents the severest mental involvement arising in youth, as imbecility does during the period of childhood, and senile dementia in old age. The

NO. 7

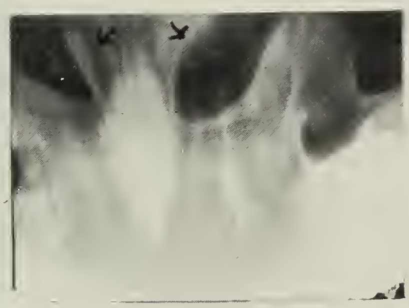
NO. 8



NO. 9



NO. 10



NO. 11

NO. 12

symptoms of these three varieties of aberration differ by only so much as the infantile mind differs in reaction from that of the young, and this from the mentality of the aged. The problems of these conditions in their relations with irritative disease have been discussed elsewhere. In this paper it is practicable to give only an illustration of the lesions occurring in a case of dementia precox, and in one of imbecility.

The dementia precox case was in a young man in the twenties, in whom the symptoms were incoherent talk, insomnia, great restlessness and a destructive tendency. He tore his clothing and blankets, his consciousness was much clouded and he had many delusions. Inspection of the teeth showed an evident impaction of the lower second bicuspid. The upper left cuspid tooth had apparently at some time been extracted, and the right upper cuspid was present as a decayed stump. It was decided to take skiagraphs only in the molar regions. Skiagraphic examination was carried out with difficulty, and came near to failure from lack of thoroughness. It showed, in addition to the foregoing lesions, both lower third molars impacted at almost a right angle (Fig. 9), and the right upper first and second bicuspid teeth in an advanced condition of exostosis. (Fig. 10.) Close inspection of the film of the latter region showed a curious structure in the upper lefthand corner, looking like a tooth partly visible, lying horizontal. A film covering the front of the upper jaw on both sides was then taken and disclosed both upper cuspids impacted in the roof of the mouth. (Fig. 11.) The pressure of the right cuspid had undoubtedly been instrumental in causing the exostosis of the adjacent bicuspids. It was necessary to extract all of the affected teeth, seven in number. Extraction of the cuspids was difficult and bloody. The patient made a good recovery and is carrying on his usual avocation.

The lesions occurring in imbecility are likely to be multiple, corresponding with the severity of the disease, and to involve the teeth near the front of the mouth, as the symptoms usually appear early. Impactions may be right-angled or nearly so, as at later periods of life. There is, however, one rather more characteristic dental displacement, of which the following case furnishes an instance.

The patient was a girl of nine, unable to learn in school or to play with her fellows, and with attacks of nervousness, ungovernable behavior and dirt-eating. Skiagraphs showed the upper cuspid on each side directly above the first bicuspid and impacted against it. (Fig. 12.) Below the bicuspid was the first temporary molar, much decayed. In July, 1909, the temporary molar and the bicuspid were extracted on each side to allow the cuspid to appear. The mental condition has since improved, and the nervousness and dirt-eating have disappeared. The child now plays normally with the other children. This case was reported in August, 1910, in the Edinburgh Review of Neurology and Psychiatry.

Ever since the study of insanity began the psychoses have been known to develop as a consequence of disease of all kinds, and of practically every organ of the body. Mental recovery has occasionally followed cure of these lesions. Such cases have usually been chance observations, but more or less successful efforts have beeen made to connect some of the psychoses in a causative way with pelvic, ocular and renal disease. To make such knowledge available for diagnosis and cure of the individual case, an explanation of these facts must be sought in a theory sufficiently comprehensive to include them all.

Three different conjectures have hitherto been thought to furnish the most probable explanation; that the psychoses are due each to a special poison as yet undiscovered, an autotoxemia; that they are caused by mental stress, usually if not always sexual in subject matter, in the form of mental traumata suppressed as conscious memories; and third, that they are due to a hereditary defect in mental make-up, a viciousness in the blood or the brain, constituting one of the many varieties of degeneracy. We may dismiss this last as too vague to require comment.

The two remaining theories represent the physical and the psychic views of causation. In considering the probability of a single and invariable cause, whether physical or psychic, for a purely mental symptom-complex, it is to be observed that we are reckoning with the highest and most complex reaction-

mode possessed by any tissue in the body. It is the function of the ganglionic masses as the organ of mentality to give at different times and in different individuals varied responses to similar stimuli. In this lies the difference between these reactions and those of simple reflex and automatic response, those being comparatively uniform. While emotional and intellectual responses to certain stimuli become habitual and more or less alike in large numbers of people, through similarity in education and environment, these reactions are in no sense specific, but are readily and often quickly changed even by influences which may seem trivial. The sight of a levelled revolver awakens fear in many men, it arouses others to fury. A cat that gives pleasure to one, causes mild disgust in another and the wildest alarm in a third. Associations of thought vary as widely as do those of emotion. These chains of association are ever mobile. Their paths are quickly closed and opened by a great variety of determining factors. Ether or jam, although inoffensive or even pleasant, is made disgusting by a single overdose. The sight of blood causing faintness and nausea becomes a matter of indifference after attendance at a few operations. The sound of cannon inspires no fear after a few battles, except in the coward whose panic is intensified by repetition. Illustrations of this point might be made endless. Such instances are too familiar however to require further elaboration.

A similar variety is seen in the way in which different people bear the doubts and troubles incident to even ordinary existence. Many overcome mental stress most easily by ignoring, and as nearly as possible forgetting their difficulties. This reaction-mode is the one appealed to by the Christian Scientists. Others find relief by recognizing their troubles and outfacing them. This opposing principle is the basis of the cathartic method so carefully worked out by Breuer and Freud.

With regard to the theory of a specific toxin it should be easy to estimate its probability. It is a significant fact that irritant poisons, and even mechanical irritants, are capable of initiating emotions and mental processes not to be distinguished from those caused by purely psychic stimuli and

impressions of special sense. Depression after a financial loss is the counterpart of that following influenza, or of that accompanying alcoholic or septic intoxication or surgical shock. Either of these factors may, instead of causing depression, give rise to elation, to irritability, or to mistaken and delusional notions.

Poisons are among the commonest causes of mental aberration of all kinds. In view of the fact that morphin deadens pain, that diphtheria causes neuritis, that the toxins of malaria and typhoid produce delirium, poisons are thought to have usual or habitual effects, which may be relied on and may furnish the basis of speculation. Grasping this less than half-truth the broader fact is lost sight of, that diversity of reaction is characteristic of the higher modes of nervous response, and becomes progressively greater as function becomes more complex. Man is capable of mentality by virtue of this very diversity of reaction. Among all the known poisons, chemical and autogenous, there is not a single one which elicits a uniform psychic reaction. Suppose a patient in hallucinatory delirium, seeing reptiles and insects, and wild with terror, or again in a state of incoherent rambling and incapable of mental effort. It is not necessary in either event to determine in minute detail the exact mental content and its antecedents in the history of the patient's acquirement and experience. The vital thing is to determine whether alcoholic or typhoid toxemia is responsible, whether malaria, diphtheria, surgical trauma or other irritant is the underlying physical state. The cause remains the same, whether the patient is jovial in the tavern or weeping on the curb, whether he is in terror, or incoherent, bellicose or expansive.

Coming now to the subject of the psychoses the same diversity of reaction observed in the genesis of normal mental states and in conditions of delirium is found to obtain without exception in all insanities of known cause.

Alcohol in its remoter and more enduring results on mentality is responsible for many cases of insanity, and may well be used as the type of the toxins productive of mental symptoms. The report of the Manhattan State Hospital reflects

the most recent professional opinion with regard to classification. The symptom groups expressly included among the alcoholic insanities in the report for 1909 are classified as: acute hallucinoses, Korsakow's syndrome, paranoid states, delusions of jealousy, chronic hallucinoses, delirious and confused states, and deteriorations. Of these there are in all 91 cases. The statement is made that alcohol plays an important role in many other psychoses, for instance, mania and melancholia, so that many additional chronic alcoholics are placed in the group of manic depressive insanity. In some cases the alcoholic psychoses present the symptoms of dementia precox. These cases are in the Manhattan report sometimes placed in the alcoholic group, sometimes classified under the head of dementia precox.

Paresis is one of the best-known of the organic insanities, and with as well-defined a lesion and consequent symptom-complex as has any aberration of organic origin. Its typical lesion is in different cases the cause of expansive and depressed emotionality, of delusions of grandeur, personal shame, disgrace and persecution, as well as of the catatonic condition with its varied states; and with this variety of clinical manifestation the disease remains paresis.

The same diversity obtains among cases of insanity caused by psychic shock, fatigue, worry, and every kind of mental stress as among those caused by poisons. A great grief or sudden fright may result in either mania, melancholia, or delusional or hallucinatory insanity with no features distinctive of the origin of the symptoms. Financial loss and sexual trauma, overwork, grief and excessive joy when they cause insanity have no specific result, even no usual result in consequent aberration. These insanities of known origin are as mental states not distinguishable from mania, catatonia and the like, whose origins are still in doubt.

The importance of mental traumata and strains in causing insanity must be readily apparent to even a casual observer of the insane. That this special mechanism is operative as an efficient and continuing determinant of a severe psychosis in any given case requires in proof something more than the

presence of disjointed references to past troubles in the talk of the patient. Curative results by mental purging, if not due to suggestion, would be demonstrative, but they have thus far been confined to such nervous and mental states as are amenable to other hypnotic methods.

The theory of an exclusively sexual origin of dementia precox and other major psychoses is an inference from observations made on hysterical cases. It rests on a misapprehension of the strength and importance of the sexual instinct. It is easy to overrate the significance of this function. Necessary as it is for the perpetuation of the race, this perpetuation is equally conditioned on the survival of the individual through years of non-sexual life. Sexual feelings, far from being predominant, habitually give way to intense fatigue, hunger, physical illness and many other conditions vital to the individual. The insane often give freer utterance to their thoughts than do the sane, and especially in cases of mania and dementia precox this brings sexual thoughts and memories to frequent mention, but if one gives such utterances their face value without special interpretation sexual matters are not remarkably common objects of comment even with patients of this class. Assigning to the sexual field the highest possible importance, it cannot furnish the cause of any one symptom complex in all cases. Unless insanity is a special creation, not derived from the ordinary workings of mentality, it must be governed by the same laws of diversified reaction that obtain among the sane.

It remains to suggest a working theory of the psychoses, if any can be found in connection with the cases here cited and the earlier cases of the series reported elsewhere. This is possible by excluding all factors not common to all of the cases, leaving as essential the characteristic which is present in all of them alike.

Considering the cases due to physical causes, any organ of the body possessed of sensory nerve-endings is capable, under the influence of irritant disease, of setting up mental aberration, varying in severity according to the circumstances of the disease and the equation of reaction of the individual.

Again, considering, not the location nor the particular organ involved, but the kind of lesion, it matters not whether it is a chemical or mechanical agent, an organic or inorganic irritant. The only quality which we can predicate of disease which causes aberration in the emotional or mental sphere is that it involves a stimulation of nerve-tissues, either applied locally at their endings in the viscera and other organs, or reaching those endings by way of the blood-stream.

Mental excitants seem at first sight to have little in common with physical irritants. They have, however, an identical result on nerve-tissue; they excite it to activity, with sufficient power finally to produce exhaustion. The identity of the mode of action and result of these two corresponding excitants of the brain is recognized in medical phraseology; mental stimuli, mental traumata, and psychic shock are as freely referred to as are those of physical origin.

The result of mental and of physical trauma is the same not only on the mental, but on the body-processes; vascular, cardiac and visceral conditions caused by grief, fright and other profound emotions are clinically indistinguishable from those due to crushing injuries. The result of the various forms of peripheral irritation on the brain-cells has been quite recently investigated pathologically by Crile, and he has found the changes in the cells to be identical, whether they are caused by trauma, toxins, or psychic shock. The only quality common to all of these determining and exciting causes of aberration is that they are irritant stimulants of nerve-action. As all activity of nervous tissue has its origin and determining cause in stimulation by irritants, so overaction has as its cause overstimulation. Overaction is the primary and essential element of the psychoses. Defective or deficient action is produced in them as a secondary effect by inhibition or later by exhaustion.

No doubt irritants of some kinds and in particular locations are more often efficient and enduring causes of aberration than others. Although I am thus far able to report recoveries from dementia precox due to disease in only the one locality,

the fact that pelvic, digestive, and other disorders are causative in cases of manic-depressive insanity creates a strong probability that other irritants besides the dental ones will be found causing the dementing psychoses also, whether of the childish, adolescent or senile varieties.

Demonstration of the above considerations in breadth and in detail would require more exhaustive consideration than is possible within the limits of this paper. These illustrative cases are selected from a series comprising an experience mainly in the fields of pelvic, digestive and dental irritants. The scope of the inquiry might be indefinitely enlarged. It is advisable to make a beginning with cases adapted to the ready bringing of curative results into clear relief; and in which irritations may be removed with ease and some assurance of completeness. To this end early cases of the dementing psychoses of childhood and adolescence may well be chosen, on account of their hopeless outlook under expectant treatment. Cases with dental lesions as their main causative factor are among the best for demonstration, as irritants in that region in a comparatively large proportion of cases may be readily found and easily removed.

DISCUSSION.

DR. W. C. HILL, CLEVELAND, OHIO.

I have seen some of these cases, both before and after the correction of the dental abnormality and the results have been just what Dr. Upson has told us they are. We all know what eye strain and adenoids will do, and there is no reason why any abnormality or irregularity of the teeth should not have the same clinical bearing. I remember distinctly one case in which impacted teeth were removed and the patient, a child, made an excellent recovery. I am fully convinced that irritation coming from the dental organs is equally as disastrous as the irritation caused by eye strain.

DR. HENRY K. PANCOAST, PHILADELPHIA, PA.

This paper was particularly interesting to me, first, because I had two of Dr. Upson's cases, and, second, because during the past year I have done more dental work than anything else, except perhaps cases of fracture and urinary calculi. The first case of Dr. Upson's which I saw was rather a startling one. I did not know what the type of injury was, but I succeeded in getting a number of films after many trials. There is another field somewhat allied to this one, and that is peripheral irritation causing obscure neuralgic pains. One of Dr. Upson's patients was of that type. Since he began this work, I have had a large number of cases of peripheral irritation causing such obscure neuralgias. This is a large field, one which we have only just entered.

From the roentgenologic standpoint, it is exceedingly important to make not only plates but films also of these dental conditions. By means of the film one may quite often discover something in the plate that would not have attracted attention, and which would not be shown properly in the film because of the very limited area which it covers.

Just before leaving Philadelphia I was asked to examine the head of a patient for a possible brain tumor or an old fracture. The patient complained of persistent headaches. I refused to make the examination in this way, knowing by experience what might be caused by dental conditions. I had Dr. Cryer, our oral surgeon, examine the patient first, and he suggested making an examination of the teeth and antra. I did so, and found an impacted molar in the upper jaw; also one in the lower jaw, and disease of the antrum on the same side. Therefore, in this case the diagnosis was easily made, although without a skiagraph the case might have gone on without being properly diagnosticated.

DR. FEDOR HAENISCH, HAMBURG, GERMANY.

I recall distinctly an experience I had with a lady who complained of severe pain in the trigeminus. She was treated by various physicians for about seven years. She lived in South America, but came to Germany to get relief.

She saw all sorts of doctors and was operated on several times. All her upper teeth on the side affected had been extracted and the antrum had been opened and drained. She was sent to me for examination to find out whether she had an empyema of the left antrum, or disease of the ethmoid. I examined her thoroughly, but could not find anything wrong except some abnormal structure in the bone over the antrum, which I thought might be the cause of all her trouble. I compared these plates with other head plates which I had, and I finally found two plates which showed the same condition. Then I found a skull in the Anatomical Museum which helped me very much to make a diagnosis. I concluded that this could be nothing else than an anomaly of the nerves on the affected side of the face, which had been extracted to stop the neuralgia. Then I decided to examine the mouth, knowing that neuralgia might be started by some dental condition. I made a film and found a part of a root—I think it was the first bicuspid, imbedded in the jaw. That root was removed, the patient was relieved of her pain within a week, and it has never recurred. She had suffered from this trouble for seven years, had been treated in every possible way, and yet secured no relief until this root was extracted. Therefore, it must have been the root that was causing the trouble.

DR. CLARENCE E. COON, SYRACUSE, N. Y.

This paper was particularly interesting to me because for two or three years I have been considerably astonished at the number and variety of symptoms which may be caused by an impacted molar. Painful and painless dental conditions are certainly responsible for much suffering. It is a good thing to look over the teeth in cases of obscure conditions where there is trouble about the head. I have never had a case of dementia precox to examine, but I have had a variety of cases which were easily understood when a skiagram was made.

One of the most interesting cases I have had was that of a boy, seventeen years of age, who had a persistent tor-

ticollis in spite of every and all forms of treatment. A radiograph in that case showed the third molar in a horizontal position on top of the roots of the first and second molars. The tooth was extracted and the boy made a splendid recovery.

A few days ago I saw the case of a young lady, twenty-eight years old, who had been suffering for over two years with a dilatation of the left pupil. Her general health was good and the third molars were all in their proper places, except in the upper left jaw, where the skiagram showed an impaction. There is every reason to expect that the symptoms in this case will disappear with the extraction of that impacted tooth.

DR. E. W. CALDWELL, NEW YORK CITY.

I want to ask Dr. Upson what proportion of his cases of impaction have mental symptoms? I know there are many cases in which there are no mental symptoms, but I wondered how often this does occur.

DR. W. F. MANGES, PHILADELPHIA, PA.

I have had occasion to do considerable of this work, and I am convinced that we have not paid enough attention to these cases. The surgeon never thinks of the teeth as causing any of these troubles. I had a case of this kind, where both lower molars were at an acute angle with the molar in front, but the apex of the angle was directed downward, that is, the crown of the third molar was resting against the root of the second molar.

Another instance was that of a lady who had a bicuspid extracted, but a portion of the root remained in the jaw and produced neuralgia. The surgeon removed this root, but the neuralgia continued. She was brought to me for further examination and I made a number of films. On the first skiagraph was a small semicircular shadow, very thin and very faint. It was not near a tooth. It looked like a foreign body. I made several more films and on each one I saw the same shadow. I did not know what it was, so I con-

sulted an oral surgeon, who told me that it might be some instrument that had been left in the jaw. He operated and removed a single thread of gauze, which had evidently been left there after the removal of drainage. It was coated with calcareous material which accounted for the faint thin shadow I saw. The patient made an immediate and perfect recovery.

DR. GEORGE H. STOVER, DENVER, COLO.

I would like to ask whether in any of these cases where there was a suspicion of brain tumor an ophthalmoscopic examination of the eye showed any change in the optic disc?

DR. GEORGE C. JOHNSTON, PITTSBURG, PA.

I have seen a number of cases, none of which have given rise to mental symptoms as pronounced as those described by Dr. Upson, but I have seen quite a number of nervous wrecks—women always—that were directly due to impaction of teeth. One case in particular, where there was impaction of a wisdom tooth against a molar, and on extraction of the molar the unerupted wisdom tooth, which was lying transversely in the jaw, was pushed into the antrum and remained there for some time before I could succeed in getting anyone to go in after it. They thought the tooth had been absorbed, although I had plates which showed its position in the jaw exactly. After a year the tooth was removed.

In making these examinations it is my custom always to use plates first and to examine both sides of the mouth. I include the jaws as far backward as the bicuspids. The films are used to show the jaws from the bicuspids to the incisors.

DR. GEORGE E. PFAHLER, PHILADELPHIA, PA.

Most of my work in private practice at present is examination of the teeth, and I think it is due in part to the fact that Dr. Upson has awakened the interest of the profession in this condition of the teeth as a possible cause of nervous affections. One of the first patients sent to me was a theological student who had been advised that he was suffering

from dementia precox and that it would be necessary for him to discontinue his college career. He was having some trouble with his teeth and he was referred to me for a radiographic examination. I found an abscess at the roots of one of his molars. This was treated and a cure effected. A month later the father of the student reported that he had improved decidedly, and returned to college, and had not had any further disturbance.

There is no doubt in my mind that I have seen enough cases to be convinced that trouble in the mouth is the cause of many of these nervous conditions. However, we must bear in mind that every case of nervousness or dementia precox is not due to the teeth, and that this is only one part of the body which should be investigated in every one of these cases. When a patient of this kind is brought for examination we must not stop with the examination of the mouth and jaws, because we often find a lesion where it is least expected.

One patient referred by a dentist knew that one of his teeth was in bad condition because there was pyorrhea about the borders of that tooth. He had had attacks for ten years. I made a complete examination of all the teeth and instead of finding only one abscessed tooth there were six others in the same condition. Therefore, we must make these examinations complete.

I feel very strongly on this subject, that these cases are not thoroughly investigated, and it is our fault that it is not done.

With regard to the technic to be employed, I know that we can examine the front teeth with plates equally as well as we can the back teeth, especially the teeth in the lower jaw, by twisting the head strongly to one side or the other, so that the anterior portion of the jaw is brought squarely on the plate, and the rays are sent through the jaw from before backward. In that way you can bring out the shadows clearly. You get greater depth than you would when a film is used. The examination of the anterior teeth by means of films is difficult. One of my patients had a brother-in-

law who had suffered from nervous symptoms for eight or ten years. I made a skiagraph and found impacted molars. The patient's mother had had impaction and abscesses.

DR. UPSON (closing the discussion).

The case of the lady reported by Dr. Haenisch is very interesting and suggestive, as are the cases reported by the other speakers. One of the most striking cases of this kind I saw about six or eight months ago. It was a child eight years old who began to have neuralgia in the left side of the face. It grew worse and worse, in spite of the fact that all the available remedies were tried. Finally she was kept under the influence of chloroform for a great part of the day. This went on for six weeks, when I saw her. Apparently the pain had begun in some of the teeth in the upper jaw, and had later become generalized. Skiagraphs were made, and some of the temporary teeth had been extracted, but to no purpose. I had more skiagraphs taken and found two conditions. There was in the upper jaw a crowding of the teeth. That was relieved by the extraction of one bicuspid. The first permanent molar had a large cavity. Under ordinary circumstances I would have had the dentist fill it, but the case being urgent I felt it advisable to have it extracted. This was done, and the child has had no pain since. The decay was found to have reached the pulp, and there was in addition a large pulp-stone.

Widely diverse symptoms are at times the result of dental irritation. A man whom I have known for thirty or forty years began three years ago to have severe pains in his stomach. The attacks resembled those of gall-stones. His physicians gave him morphine and controlled the attacks as best they could. Nothing radical was done, however, until after two years, when he had two or three old roots extracted which were badly decayed and had bothered him a great deal. The attacks inmediately ceased and have not recurred.

Dental pain is said at times to shoot down into the arms and legs, but apart from local pain the pain which is most common in these cases is headache. I have had a number of

FIG. 1

BLASTOMYCOSIS OF THE METACARPAL AND PHALANGEAL BONES—HOLLISTER E. POTTER

cases of headache in which very gratifying results followed the removal of decayed teeth or roots.

As to Dr. Caldwell's question, I do not think that I can answer it. If you ask what proportion of cases suffering from severe melancholia and dementia precox show dental conditions responsible for the trouble, I would say that the proportion is fairly high. Irritation from the teeth may not cause any pain whatever, and yet produce severe nervous disturbances. Irritations caused by impaction rarely cause pain unless the superficial tissues are involved, when there may be pain, locking of the jaw, and symptoms that are quite obvious. In most cases, however, there is no local pain, although many of these patients complain of headaches and pain in distant parts of the body in addition to their mental symptoms.

Dr. Bowen asked about the bridge case. I think the appearance in the skiagraph was rather deceptive. The bony structure has been largely eliminated, but there is left enough soft structure that is pervious to the X-ray to attach the tooth to the jaw.

THE RADIOGRAPHIC FINDINGS IN OSSEOUS AND PULMONARY BLASTOMYCOSIS.

BY DR. HOLLISTER E. POTTER, CHICAGO.

Following the clinical and pathologic reports that gross changes were found in the bones, joints and pulmonary tissues of patients suffering from systemic blastomycosis, we began five years ago to make radiographs of such suspected changes in all patients available for examination, with the purpose of observing the constancy of radiographic findings and the extent to which they were characteristic of the disease.

Fortunately it has been possible, in conjunction with clinicians and pathologists who were making these cases a special scientific study, to observe seven patients presenting more than a score of interesting and demonstrable bone lesions, to skiagraph them repeatedly at various stages of their disease, and in some cases to observe the pathologic changes post-

mortem. Eight patients with pulmonary lesions were skiagraphed, three of them showing incipient changes only. Additional and confirmatory evidence was also obtained from the gross specimens preserved from autopsies made previous to our observations.

Of the twenty-two cases of systemic blastomycosis reported before August, 1908, complete autopsies were obtained from ten. The lungs of each of these cases showed distinct blastomycetic lesions, the pleurae being affected in four cases; the vertebrae also showed changes in four cases and one or more of the other bones in six cases; in three cases certain joints were pathologic. Lesions have been recorded as occurring in nearly all the bones of the body.

In our radiographic work there have been demonstrated marked changes in the vertebrae, the ribs and the pelvis; the scapula, humerus, radius and ulna; the femur, tibia and fibula; and in the long and short bones of the hand and wrist, foot and ankle. These will be seen to include bone groups from the entire body, with the exception of the skull, sternum, clavicle, etc.

OSSEOUS SYSTEM.

The primary or constant finding in the active lesions in bone is that of localized dissolution. So intense and well-defined is this process that it results in the peculiar condition in which cavities of completely dissolved bone lie immediately adjacent to spongy bone tissue apparently intact. The fringes of bone forming the walls of these cavities retain their full calcium content until with advancing necrosis they in turn are completely liquefied. Diffuse appearances in the neighborhood of a blastomycetic focus is the exception.

These areas of total necrosis may be found singly or in groups. If multiple they may coalesce as they increase in size with the formation of a single larger abscess. They may appear anywhere in the structure of the short bones as the carpus or tarsus, and here show the same tendency to affect neighboring bones and joints by direct extension as does tuberculosis. The affected bones, however, do not show the same diffuse porosis and general decalcification as in tubercu-

FIG. 2
BLASTOMYCOSIS OF THE METACARPALS—HOLLISTER E. POTTER

losis but are more patchy in appearance, certain bony compartments retaining their structural integrity to the last. In the long bones the foci appear as a rule in the spongy portion of the diaphysis immediately beneath the epiphyseal line, or, in the absence of an epiphysis, beneath the joint surface. In one instance observed the focus probably developed within the epiphysis.

The secondary finding of import is that of proliferation. Though frequently not seen, its presence and appearance assist materially in identifying the nature of the process, and particularly is this true in locations where the details of the edges of the focus are veiled by quantities of overlying bone or soft structures. In its typical form the proliferation is seen as a bony sheath partly or completely surrounding the end of one of the long bones within which a focus is developing. The proliferated bone is mature and homogeneous in texture, and its amount is practically proportionate to the slowness of development of the central abscess and the lateness of its rupture into the surrounding soft tissues. Thus bony periosteal formation is a sequel to chronic destruction and may be absent in lesions of rapid development.

As soon as the abscess obtains external communication both the destructive and proliferative processes are arrested. To obtain exit necrosis is seen to have advanced to and through a much thickened periosteum with the formation of cloacae. Lesions in the short, flat or irregular bones rupture as a rule before the formation of demonstrable new bone giving the primary picture of simple necrosis. Many of the deep subcutaneous abscesses so frequently seen in this disease are the result of rupture of some underlying bone lesion.

In one case almost complete healing of the bone was observed. This was evidenced by the advance of new bone upon areas previously softened, decreasing their size and walling them off by sharp hard lines. Coincident with this healing of the bone was seen a retraction and puckering of a previously active lesion in the free upper portion of the left lung. No cases of completely sclerosed bone lesions have been identified by X-rays.

The cortical portion of the long bones may become involved from without by deep extension of a burrowing abscess. In one instance the tibia showed a longitudinal furrow with a thickened margin which seemed to lie within the shaft of the bone until a transverse projection showed it to be superficial.

Sequestrated bone has not been observed radiographically except in the form of small detached fragments of spongy material resembling the fringe lining a cavity. In no case have we seen evidences of rupture of foci into the medullary cavity. The constant indications are those of external rupture followed by simple softening due to regional extension.

From a radio-diagnostic standpoint we will therefore select the following appearances as being of value in speaking for the blastomycetic nature of infectious foci in the bone:

1. The combination of sub-epiphyseal or sub-articular focus of an intensely localized character with a mature and homogeneous periosteal sheath around it. This is the most distinctive appearance and is commonly seen in lesions of the long bones.

2. Lesions of the spine show the same patchy appearance that is found in the short bones of the wrist. A marked destruction of the vertebral bodies may take place before a collapse of their substance occurs. This is probably due to the persistence of certain bony compartments immediately adjacent to the abscess cavity.

3. Blastomycosis in any of the bones when not accompanied by the periosteal reaction shows a maximum of localized destruction with a minimum of porosis or partial decalcification in the neighboring bone.

We realize that the number of lesions skiagraphed has been limited and record these observations and deductions subject to the modifications or additions that further study may bring out.

THE LUNGS.

In several of the systemic cases coming to autopsy there has been found considerably more pulmonary involvement than could be detected by clinical methods during life. This, together with the fact that these lesions can easily be demon-

FIG. 3
BLASTOMYCOSIS OF THE ACROMION—HOLLISTER E. POTTER

strated by X-rays, suggests at once the value of radiographic methods in determining the presence and amount of consolidation.

To draw inferences as to the nature of such consolidations from the structure and distribution of their shadows seems at the present time impracticable on account of the few number of cases studied, as well as on account of their known resemblance to the gross lesions of tuberculosis and broncho-pneumonia. We will therefore limit ourselves to a brief outline of the radiographic findings, leaving the diagnosis of the etiologic factor to the microscope.

Of three cases which had definite systemic lesions elsewhere and but little clinical evidence of pulmonary involvement at the time of our first radiographs two showed light fleecy shadows grouped along the position of one or more bronchi. These shadows extended outward and downward from the root of the lung rather than toward the apex. In the other case the lung appeared normal except for one dense mass situated at the root of the right lung. This mass extended vertically along the edge of the mediastinum, had an irregular border, and gave no internal structural details. It resembled some mediastinal tumors we have seen encroaching upon the lung.

Two cases showed many masses, one-half to two inches in diameter, scattered over the region of both lungs. Each of these masses gave such a deep shadow and was so devoid of internal structure that it suggested a complete displacement of air throughout its extent. No empty cavities were demonstrated.

Another case showed these same disseminated masses, plus a very large mass of total consolidation at the root of the left lung.

In another the findings were those of simple cavity. A ring of consolidation with a few radial markings exteriorly surrounded a clear transparent area nearly two inches in diameter.

The last case skiagraphed showed no definite details on account of the extreme dyspnoea of the patient. The result, however, showed many massive consolidations throughout both lungs.

These findings support the pathologic statements that pulmonary blastomycosis is frequently bronchial in origin, and that very large masses of diseased lung, involving even the major portion of the usual air-filled space, may exist before death takes place.

I am indebted to Dr. Oliver Ormsby, dermatologist, and Dr. A. M. Stober, pathologist at Cook County Hospital, for their kind assistance in furnishing material for these observations.

AMERICAN ROENTGEN RAY SOCIETY.

Proceedings of the Eleventh Annual meeting, held at the Hotel Cadillac, Detroit, Michigan, September 29-30, and Oct. 1, 1910, under the Presidency of Dr. George E. Pfahler, of Philadelphia.

FIRST DAY—MORNING SESSION.

The Society was called to order by the President at 10:00 A. M.

The Secretary, Dr. Percy Brown, read the minutes of the preceding annual meeting, and on motion they were adopted as read.

The Secretary then read his annual report:

SECRETARY'S REPORT.

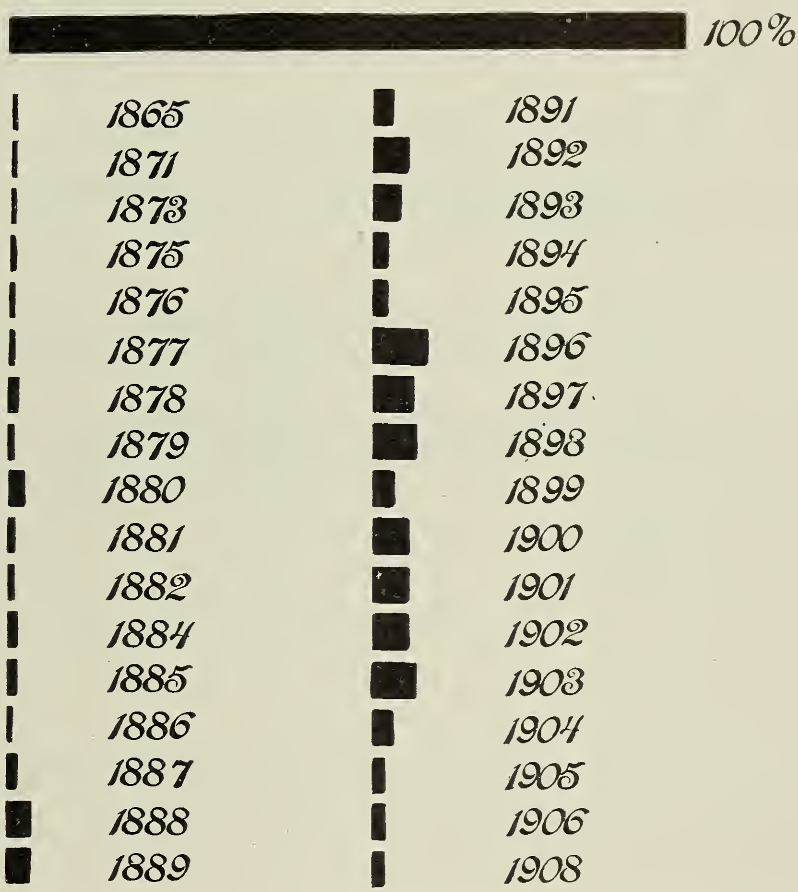
1910.

It becomes the pleasant duty of the Secretary of this organization to report a year of absolute prosperity, so far as the interests of the Society are concerned. What our increase in membership may possibly have lacked in quantity it has gained in quality. Our periodical publication, the "American Quarterly of Roentgenology," has been well received and, what is better, possesses a quality such as to merit the highest commendation. We have been in correspondence with representatives of other organizations, both in England and on

the Continent. We feel that the benign influence of American Roentgenology has become more widely felt and has tended to attract alien eyes to the work done and the results obtained by the workers of this nation.

A few months ago, it occurred to the Secretary that today

Chart I. Date of Medical Degree

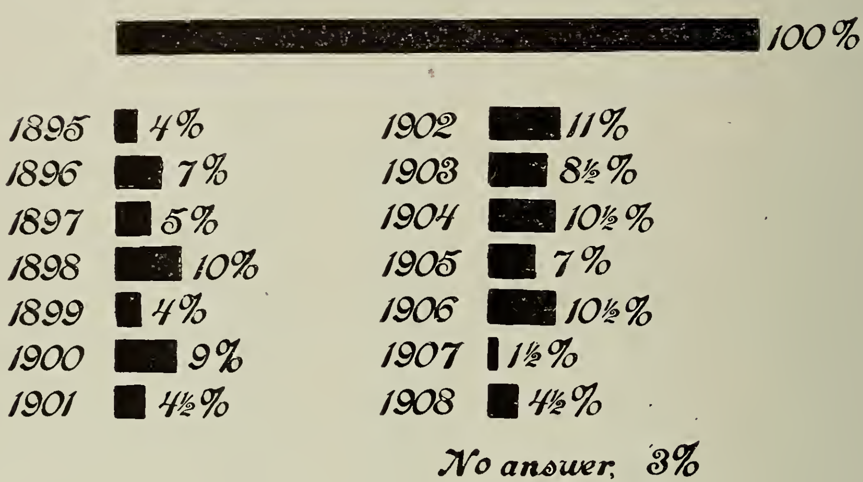


we meet nearly fifteen years since the announcement by Professor Roentgen at Wurzburg. A decade and a half, then, suggests itself as an interval during which Roentgenology in America has been brought into the world and has become, as the clinicians say, "well-developed and nourished."

The Secretary has tried to make, as nearly as possible, accurate observations upon this post-natal development, and, to further his ends, he has sent to the members a mild type of the much-despised blank-to-be-filled-out. He received answers from possibly a little more than one-half of the total membership of the Society. This, to his mind, was by no means unfavorable, when one considers how difficult it usually is to obtain responses to requests of this kind. The questions which this blank contained the Secretary feels that he is forced once more to repeat in order to elucidate the

Chart II.

"Year in which you became interested"— &c



general trend of this report. In order the better to portray the nature and variety of these answers the writer has drawn a series of charts, which will now be presented seriatim.

Chart one deals with the second question upon the list, to wit, the Date of Medical Degree. This chart demonstrates fairly well the professional age of the members of our Society. It will be noticed that the first material increase in percentage takes place among the graduates of about the year 1888. Then there is a gradual decrease until the year 1895. From 1895

until the year 1903 are graduated by far the largest proportion of our membership. This, apparently, has a distinct bearing upon the date of Professor Roentgen's announcement and the marked interest thereupon shown by many young medical graduates accounts for our large percentage from 1896 to 1903. The beginning of 1904, however, the percentage again becomes small. Whether or not this is due to the fact that about that time the unquestioned dangers to which X-ray workers became apparent or not, I will leave for you to decide. To sum up, then, we can say that the majority of our

Chart III.

"Did you, at this time, take up the practical application of the Rays?"

members were graduated in medicine from the years 1896 to 1903. This represents a large proportion of our membership therefore as being well within the prime of their activity, and consequently speaks well for the future of the Society.

Chart two presents the nature of the answers to the question, "Give the year in which you became seriously interested in the Roentgen rays." On the whole, this chart is as interesting as the previous one. There seems to have been a marked increase in interest during the years 1896 to 1898. From 1892 until 1902, initial interest had somewhat subsided

Chart IV.

"Did you continue with your established work?"

Chart V

"Have you relinquished your established work?"

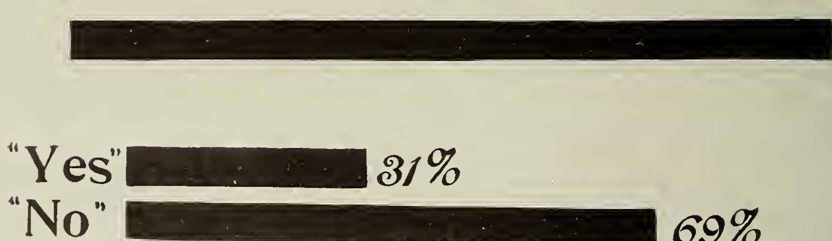


Chart VI.

"Are you now practising Rontgenology as an absolute specialty?"

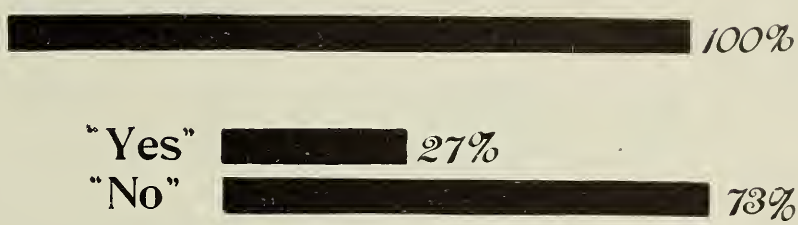
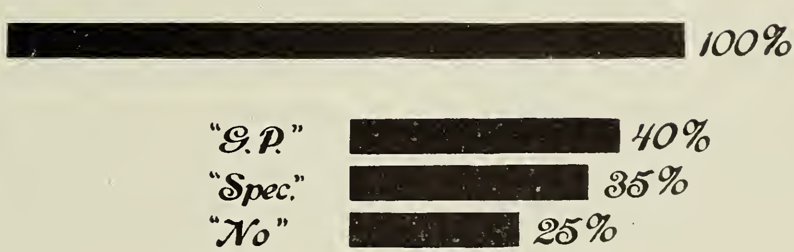


Chart VII.

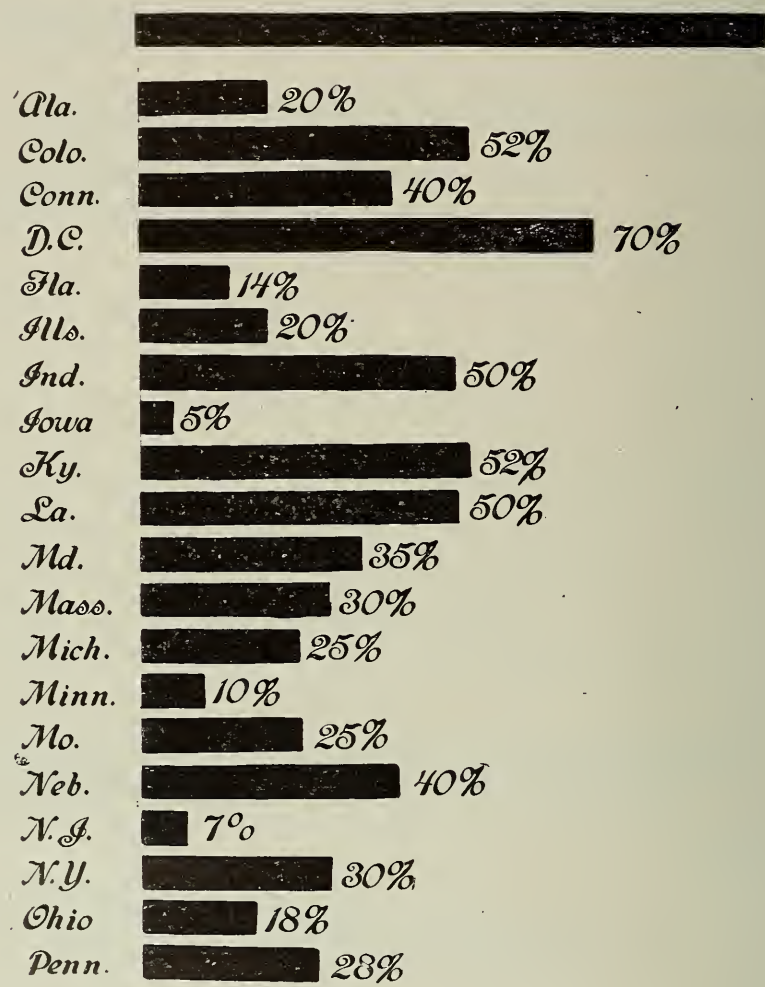
"General Practice, or Specialty other than Roentgenology?"



only to light up again, however, in 1902, when the proportion reached a greater figure than it had before shown at all. You will remember that about this time the German tubes appeared on the market, as well as the Albers-Schoenberg "Compressions-blende." The improvement in the results

Chart VIII.

Proportion of medical communities "educated up" to Rontgenology?



which this information brought about no doubt tended to increase general interest at this time. Just why there is such a decrease in the year 1907 is not known. It is apparently due to chance more than anything else.

Chart **three** answers the question, "Did you at this time take up the practical application of the rays?" It is interesting to note that as many as 92% answered in the affirmative and but 4½% did not. The remainder took it up from two to five years later. This indicates the absorbing interest which immediately controlled those who became interested in the art at all.

Chart **four** answers the question, "Did you continue with your established medical work?" 87% apparently did, whereas 13% forsook the pursuits in which they were then engaged.

Chart VIII. (Continued)

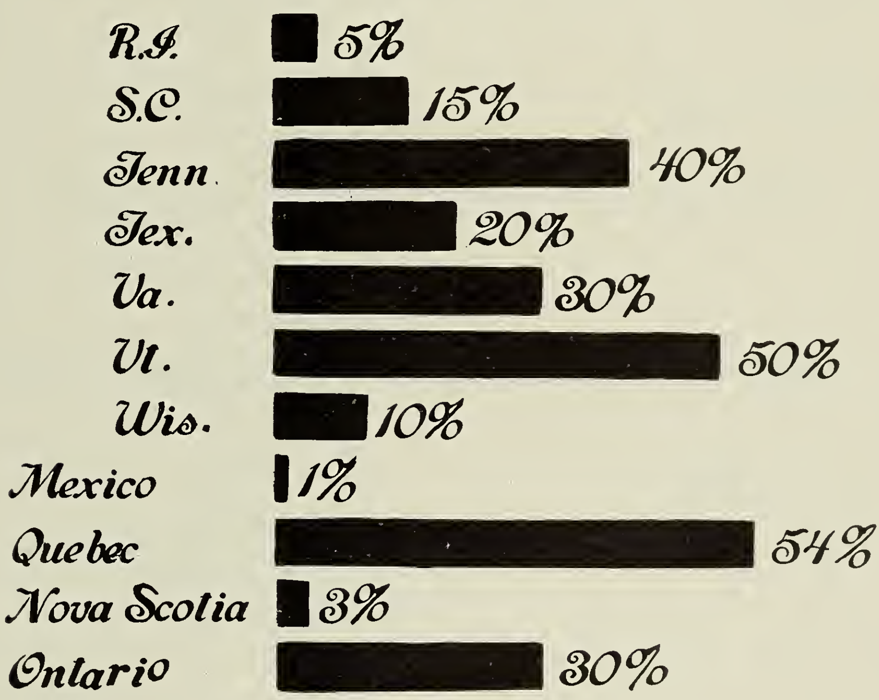


Chart **five** asks the question, "Have you now relinquished your established work?" 31% say they have, whereas 69% say not.

Chart **six** asks the question, "Are you now practicing Roentgenology as an absolute specialty?" 27% are, 73% are not. This chart seems to show how really few absolute specialists in Roentgenology there are in this country.

Chart **seven.** Of those who have not relinquished their established work the question is asked, "Are you in general practice, or in a specialty other than Roentgenology?" 40% say they are still in general practice. 35% announce that they are in a specialty other than Roentgenology. 25% make their reply "no." This latter reply seems to indicate that the question was ambiguous and I easily imagine it might have been misunderstood.

Chart **eight** is the most interesting one. It asks the question, "What proportion of the medical profession in your community is educated up to the value of Roentgenology?" I am obliged to tabulate the answers by states on account

Chart IX.

"Is the demand for Rontgen work increasing?"

of the vast number of medical communities about which report was made. You will see by this chart that the District of Columbia enjoys the distinction of being, so far as the medical profession is concerned, the most enlightened as to the value of Roentgenology. Mexico foots the list with 1% and Nova Scotia and Iowa follow closely at her heels. The small percentage of seven, which is possessed by New Jersey, is somewhat surprising. The most densely populated states, apparently, run about the same.

Chart **nine.** "Judging from your experience, is the demand for Roentgen work increasing?" This chart speaks interestingly for itself. 10% say no, whereas 90% say yes.

Chart X.

"Time spent in charity work?"

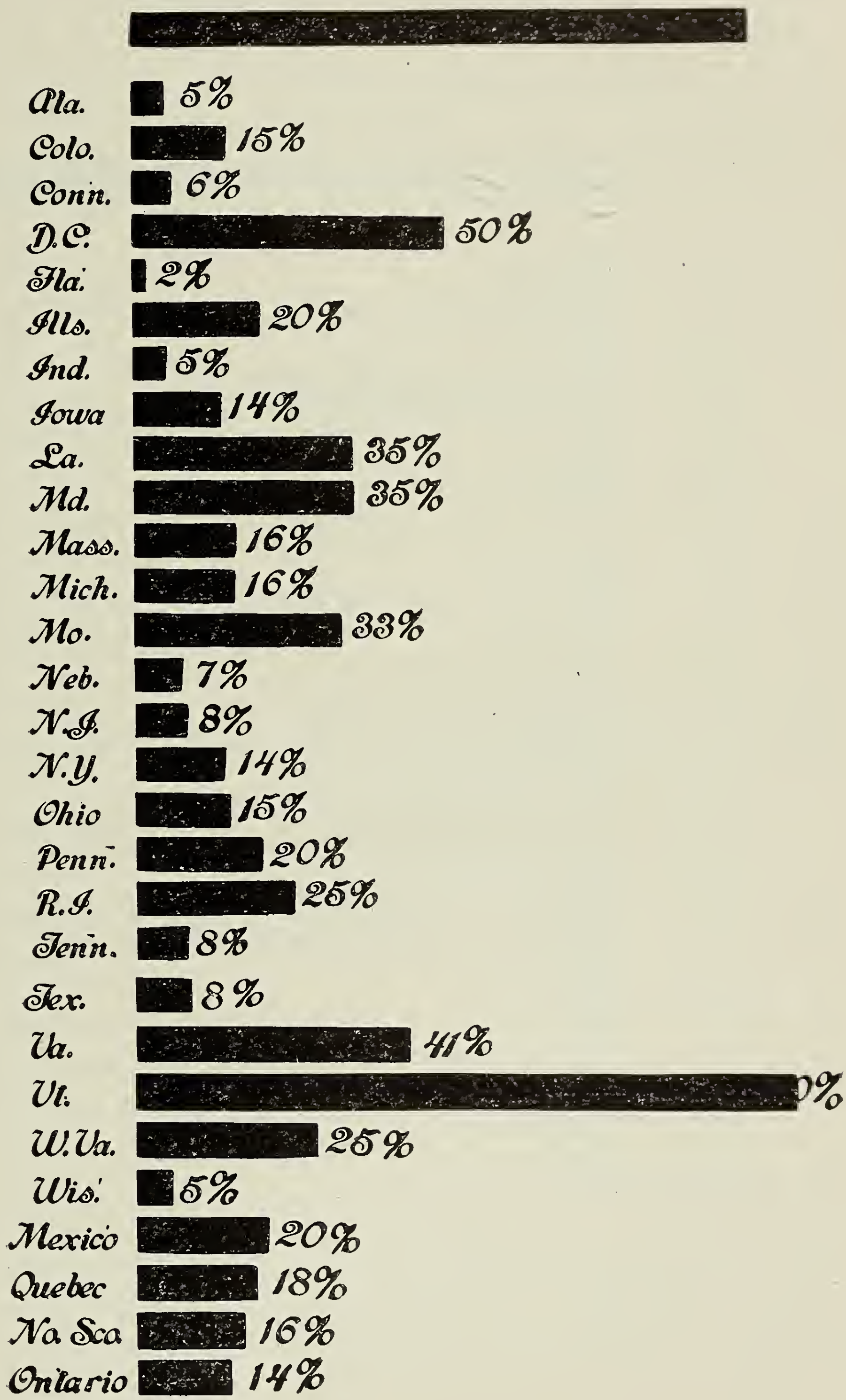
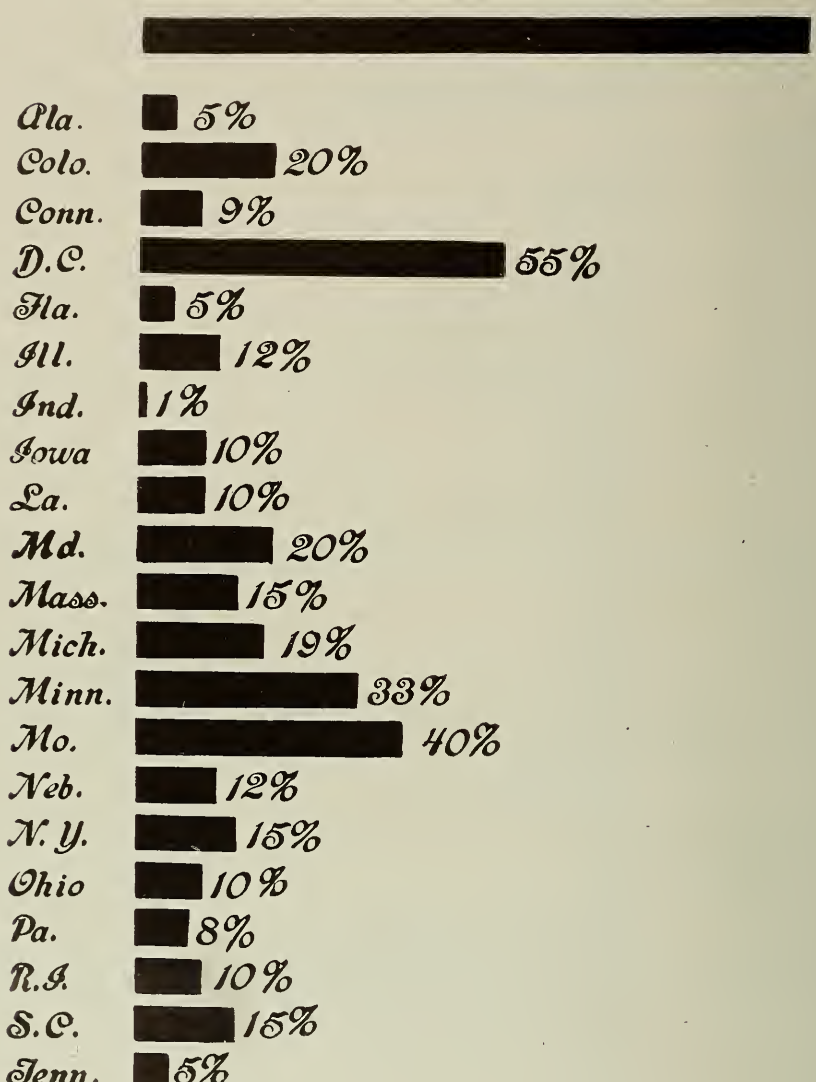


Chart ten deals with a more personal matter, "What proportion of daily time is taken up by charity work?" This question was so universally, and at the same time, so feel-

Chart XI.

"On experimental work?"

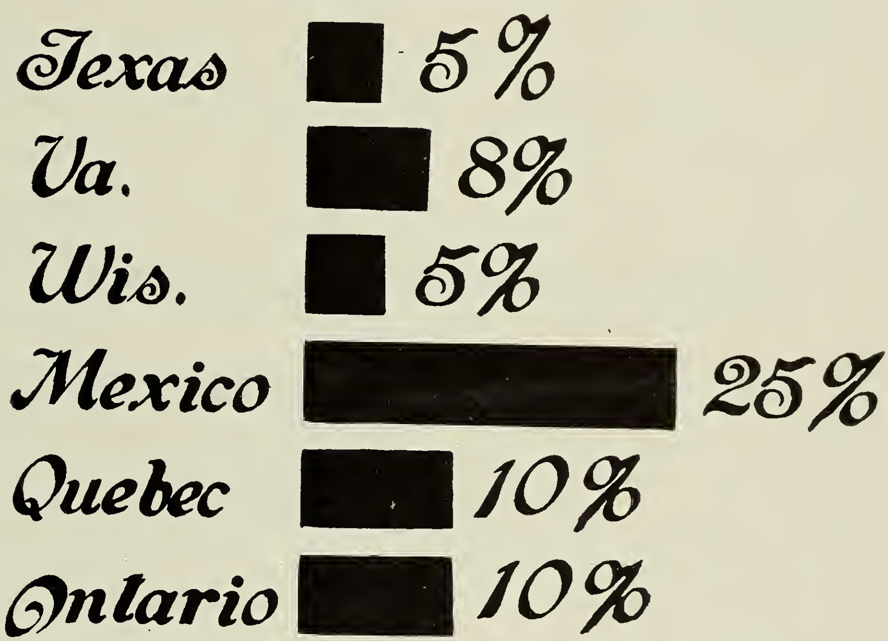


ingly answered that I have been obliged to tabulate the answers by states. The high percentage is made by one member, who frankly acknowledges that all his work is charity work.

Chart eleven. "What proportion of the week's time, for example, do you expend on experimental or literary work?" Indiana modestly keeps her percentage down to one.

The last chart is by no means the least. It answers the question, "In which are you chiefly interested, Roentgen diagnosis, or therapeutics?" 49% say they are interested in diagnosis, 19%, on the other hand, lean toward therapeutics. A broad-minded 30% manage to embrace both, whereas 2% are not interested in either.

Chart XI. (Continued)



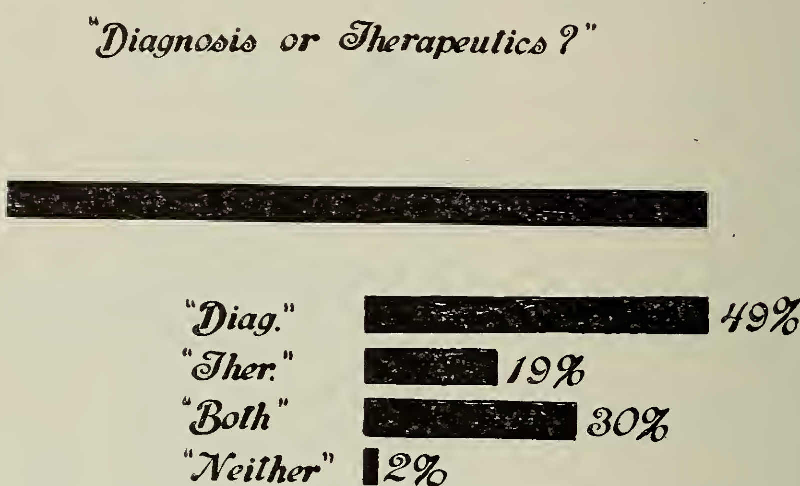
I will now present a map, which shows the distribution, throughout our country, of those who are completely, or but little, interested in Roentgenology. The blue color represents absolute Roentgenologic specialists. Those in red combine their Roentgenology with the practice of general medicine. Those in green practice Roentgenology, but are interested as well in some other specialty. The yellow ones are not only interested in Roentgenology, but in the science of electro-therapeutics as well.

A rapid glance at the entire areas of this map suggests to the casual observer that there is still something in Horace Greeley's old advice to "Go West, young man." Compare, if you will, the state of Texas with Manhattan Island.

Seriously speaking, there is yet room for Roentgenology in the United States, and it is a hope that this map may tend to impress this fact upon your minds whenever you feel yourselves crowded.

Thus the termination is reached of the first and last appearance of your Secretary as a statistician. In view of the

Chart XII



above effort, he might well be approached by the proper authorities with reference to a recompilation of the Century Dictionary, or to estimate the proportionate occurrence of the Anopheles mosquito in the State of New Jersey. In the absence of any such advances, however, and the persistent lack of any other stimulus to a naturally inquiring disposition, he now subsides in favor of those who are to present subjects of a character less dessicate.

Respectfully submitted,

PERCY BROWN,
Secretary.

Dr. Roland Hammond, Vice-President, then took the chair while the President delivered his annual address:

PRESIDENTIAL ADDRESS.

FOR THE ANNUAL SESSION OF THE AMERICAN ROENTGEN RAY SOCIETY, 1910.

GEORGE E. PFAHLER, M. D.

The Duty of the Public and the Roentgenologist.

Ladies and Gentlemen:

Having accepted, a year ago, the greatest honor at your command, I determined to prepare an address upon "Precision in Roentgenology," which was to involve some original research. My help-mate, who shared, and appreciated this honor as much as I, urged me to begin this work early, and reminded me of it a number of times, but before I could begin she was taken from me. Having lost my beloved wife, who was the source of my inspiration and ambition, I felt too much crushed to carry out our original plans, and gave up all idea of doing anything. This rambling talk has been prepared during the past few days, after being informed that something would be expected, and must, therefore, be looked upon as casual remarks rather than a formal address.

During the past year, our ranks have been depleted more than during the entire history of our society. Four faces, whose very presence was an inspiration, and whose company was a delight to all, will never meet with us again. We must not allow this to cast gloom over our meeting, for by so doing I am sure we would be disloyal to their wishes. Let us therefore each do our part to instil the same enthusiasm and good fellowship that has stamped our previous meetings with success.

Dr. Kassibian, one of the earliest members of the society, who did much toward making it a dignified scientific organization, and who recorded in his well-known book the results of his original researches, has been sacrificed as a martyr to

his early enthusiasm in this science. This sacrifice was the result chiefly of charitable work in a small, crowded room of a hospital, in which he did much fluoroscopic work without protection.

This sacrifice should serve to remind the public of its duty to Roentgenologists and should also remind us of our duty to ourselves, in providing sufficient protection against the insidious, though constant baneful effects of the rays upon those who have chosen this special branch of medical science. The smaller the laboratory in which one must work, the less will be the opportunity for protection.

The public should provide ample space for the X-ray laboratories of our hospitals. The day should have long passed when this laboratory can be placed in a closet, or the smallest room in a hospital. Yet it is a disgraceful fact that even modern hospitals have been built in which the rooms for the X-ray laboratory are little more than closets. Not only does the ordinary ventilation become a problem, but the difficulty of providing sufficient protection becomes much increased.

In the days when our examinations were confined chiefly to wrists and ankles, and when our apparatus was small and inefficient, small rooms were also consistently bad. In the present day, however, when our work has become refined, when a great deal of heavy apparatus is used even for the simple examinations, and more so in difficult ones, when no chronic disease of the chest or abdomen is completely investigated without an X-ray examination, small rooms should be as obsolete as are the original small Crook tubes, which are now kept merely for curiosity.

One must be prepared to make chest and abdominal examinations fluoroscopically, radiographically, orthodiographically, and stereoscopically, and in the prone, supine, semi-erect, and erect positions. These various examinations require special apparatus to obtain the best results, and all means more and more space, so that to-day we need from six to ten times the space that was allotted at the beginning of Roentgen work.

A modern Roentgen laboratory should have a central office, a main Roentgenographic room, a fluoroscopic room, a waiting room, a dark room, and, if possible, a treatment room. To this may well be added a photographic room, a negative exhibit room and a general work shop. There are a few such laboratories in existence. The laboratories of the Rudolph Virchow Hospital in Berlin, the St. Georg Hospital in Hamburg, the Boston City Hospital and the University of Pennsylvania Hospital will serve as examples for future hospitals. At the Rudolph Virchow Krankenhaus an entire building is provided for the Roentgen laboratory, and at the Boston City Hospital 4500 square feet of floor space has been devoted to this work.

No more important department exists in a hospital. This laboratory aids the general surgeon, the general practitioner, and each of the specialists in making diagnoses. In addition to this it renders valuable aid in the treatment of disease. The running of a complete modern laboratory, whether private or in a hospital, involves a great expense and any one who feels differently has simply the confidence of ignorance.

Therefore the public should provide ample space, ample equipment, ample protection, and ample means for running of our hospital laboratories. This is a duty they owe to themselves and to the Roentgenologist. Especially does this apply to the men who have to do with the construction of new hospitals.

Unfortunately the beginning of a new Roentgen laboratory is also often associated with the beginnings of a new Roentgenologist whose consciousness of his ignorance, and the timidity resulting from the narrow margin by which he may have obtained his position, very properly makes him hesitate to make suggestions to a dignified board of trustees. As a result the Roentgen laboratory is an after thought. Therefore it is the duty of every Roentgenologist to constitute himself a committee of one to do personal work in explaining the needs in this specialty.

We should aim to get philanthropists interested in this great opportunity for charity. This charity should even ex-

tend to the provision of a fund for the support of Roentgenologists who have become incapacitated and dependent, or whose families have become dependent, instead of making a wide popular subscription necessary.

Small hospitals, unless heavily endowed, find it difficult to support a modern, fully-equipped laboratory, with the command of a competent Roentgenologist. Therefore they cannot expect the best work.

Likewise, the general practitioner to-day can seldom afford the time, space, equipment nor the necessary knowledge for modern work. Therefore it is his duty to aid in the support of the man who is willing to properly equip himself and a laboratory and devote his life to this work.

So much for the duty of the public and the profession to the Roentgenologist. We, in turn, owe them as much. We owe them competent service, and must therefore each strive to be masters. A Roentgenologist should be a careful, honest, broad-minded man, an intelligent physician and in addition should master the technique of each examination and each form of treatment. He should be familiar with the work that has been done and recorded by other Roentgenologists, and, so far as is possible, with the progress that has been made in the general science of medicine. He should know how to avoid burns either of himself or the patient. He who burns a patient to-day in making an examination is a disgrace to our ranks. He should learn to recognize the truth and not make statements on insufficient evidence. How often we hear absurd opinions expressed by so-called "X-ray experts," whose only excuse for such a title is the possession of an instrument. It is these men who shake the confidence of both the public and the profession in X-ray work. It will take considerable time until the profession even realize that X-ray instruments no more make a Roentgenologist than surgical instruments make a surgeon.

In order to gain the confidence and support of the public and the profession we must show ourselves worthy of it, by being thorough students. We must eliminate guess-work and either state absolute facts or say we do not know. Path-

ological conditions vary to such an extent that we must not be too dogmatic but must be able to see more than one possibility and so far as possible find an explanation for the clinical symptoms. In short, we are in a great scientific field in which only the sod has been turned, and each must help the other to find the hidden truths beneath.

We have a great opportunity at these meetings and I feel that so far as possible, we should make them demonstrative instead of didactic.

Duty of the Roentgenologist to Himself.

Self-protection is the first law of nature, yet it is probably the most difficult of all for the Roentgenologist to observe. It is so difficult because the penalty comes so long after the offence, and each beginner hopes to escape. It is difficult because the enthusiasm engendered by the wonderful new revelations is apt to make him forget all danger.

I should say that he is not safe unless he can carry a photographic plate in his pocket for a week without fogging. This is easily tested by means of a dental film which can be placed in the vest-pocket. He should arrange his apparatus so that he can work from an adjoining room by means of mirrors. He should be separated from the active tube by means of an opaque wall. If he must remain in the room he should confine himself to a leaded cabinet.

Fluoroscopic work is necessary to accomplish the best results in the study of the movable organs. The tube should be separated from the patient by an opaque wall or screen, which only allows a pyramid of ray to pass large enough for the examination. This must be controlled by an adjustable diaphragm. The fluorescent screen should be covered with lead glass, and finally the operator should be behind a lead screen with a lead glass window. He should be able to control all of his apparatus while under protection. This involves many difficulties which each man must master according to his own laboratory. Here again he should attach a dental film to his fore-arm by means of adhesive plaster and control his protection.

We need not develop Roentgenophobia. It is not only possible but practical to have complete protection. Unfortunately many symptoms or diseases have been charged to the effects of the Roentgen Rays that have, I believe, no basis in fact. I will not specify the dangers, the harmful effects, nor the details of protection at this time. All of this has been recorded. I can only say "Be careful!" You can no more remove the harmful effect than you can turn the wheels of time backward.

Finally, the Roentgenologist owes another duty to himself. This is to make his work valuable, by bringing it as near perfection as possible, and then to value it, and see that he is properly paid for it. No one can afford to do cheap work, for no one can afford to do poor work.

In conclusion, I want to thank the local committee of arrangements for their faithful services in preparation for this meeting; and the officers and members for their earnest efforts to make this meeting a success.

The President resumed the chair.

The Secretary read a communication from the Deutsche Roentgen Gesellschaft, sending greetings, expressing felicitations for a successful meeting, and announcing that the Society was to be represented officially at this meeting by one of its members, Dr. Fedor Haenisch. The chair introduced Dr. Haenisch, who spoke as follows:

Mr. President, Ladies and Gentlemen: I have the honor to represent at this meeting the Deutsche Roentgen Gesellschaft, and I am instructed to bring you hearty greetings and best wishes for a prosperous session. Allow me also to thank you for your kind invitation and for the cordial words of introduction by your President. I also want to express my sincerest gratitude to the men whom I have met in this country, none of whom could have received me more kindly and more heartily. I feel honored at being a corresponding member of this Society and I also anticipate much pleasure and great benefit to come to me from my association with this Society. I also wish to extend to you the kindliest greetings from Professor Albers-Schoenberg, with whom I have been

associated for many years. I also wish to apologize for my inability to enter into a discussion of cinematographic radiography, as I had originally intended to do, because it was impossible to secure the necessary apparatus in time. I have come here to learn, to see your work, and to renew old acquaintances with men whom I have had the pleasure of meeting on the other side of the water.

A communication was also read from Professor Albers-Schoenberg and one from Dr. Charles L. Leonard, the delegate of the Society to the International Congress of Radiology and Electricity in session at Brussels.

The scientific program was then proceeded with, the first paper being read by Dr. Henry Hulst, of Grand Rapids, Michigan, entitled "Tuberculosis of the Lungs as Seen and Heard."

The discussion on this paper was opened by Dr. Kennon Dunham, and was continued by Drs. L. G. Cole and Henry Hulst.

Dr. Alfred L. Gray, Richmond, Va., read a paper on "Primary Lymphangiosarcoma of the Lungs," which was discussed by Drs. Henry K. Pancoast, Kennon Dunham, F. H. Baetjer, Henry Hulst, Fedor Haenisch, L. G. Cole, George C. Johnston, W. F. Manges, George E. Pfahler, and in closing by Dr. Gray.

Mr. H. W. Dachtler, Toledo, Ohio, presented a report on "Studies of Pulmonary Manifestations of Syphilis."

This paper was discussed by Drs. A. W. Crane, Kennon Dunham, Henry Hulst, George C. Johnston, and in closing by Mr. Dachtler.

The Society then adjourned until 2:30 P. M.

FIRST DAY—AFTERNOON SESSION.

The Society reassembled at 2:30, and was called to order by the President.

The Treasurer's report, being called for, was presented by Dr. Charles F. Bowen.

ANNUAL REPORT OF TREASURER.

Report of Treasurer, Chas. F. Bowen, Ph. C., M. D., Columbus, Ohio, from Sept. 24, '09, to Oct. 1, '10.

RECEIVED.

Balance on hand Sept. 24, '09	$ 614.22	
Received from members and manufacturers	2,194.00	
Total		$2,808.22

EXPENDED.

Zapffe, F. C. (Stenographer)	$ 181.25	
Johnston, G. C. (printing)	7.50	
Williams, Browne & Earl (lantern)	16.16	
Haddon Hall (hotel)	55.00	
Nitske Bros. (printing)	3.50	
Richmond & Backus Company (stationery)	3.60	
House, Nelson H. (stenographer)	18.25	
Bornman, John & Son (Quarterly)	302.10	
Usher, Samuel (Transactions N. Y. meeting)	944.08	
National Photo Eng. Co. (half tones)	10.00	
Terry Eng. Co. (half tones)	8.60	
Bornman, John & Son (Quarterly)	277.85	
Nitske Bros. (printing)	12.50	
Bornman, John & Son (Quarterly)	280.75	
Bowen, Chas. F. (expenses of Treasurer)	148.33	
Pfahler, Geo. E. (flowers Dr. Kassabian)	10.50	
		$2,279.97
Balance		$ 528.25

The Treasurer's account for the year of 1909-1910 has been audited this day (Oct. 1, 1910) and found to be correct.

H. K. PANCOAST,
F. H. BAETJER,
Auditing Committee.

Oct. 1, 1910.

On motion, the report was referred to the Auditing Committee, on which the Chair appointed Drs. George H. Stover, Henry K. Pancoast and F. H. Baetjer, with instructions to report on the second day of the meeting.

Dr. Edward H. Skinner, Kansas City, Missouri, then read a paper entitled "Fluoroscopy of the Gastrointestinal Tract."

This paper was discussed by Drs. Henry Hulst, Arthur Holding and George E. Pfahler.

Dr. Howard E. Ashbury, Baltimore, presented a report on "X-ray Findings in Gastric and Duodenal Ulcers," which was discussed by Drs. Fedor Haenisch, George E. Pfahler and George H. Stover. Dr. Ashbury closed the discussion.

Dr. A. W. Crane, Kalamazoo, Michigan, contributed a paper entitled "Skiagraphic Delineation of the Head of the Pancreas."

The paper was discussed by Drs. Henry K. Pancoast, Henry Hulst, Paul C. Perry, Fedor Haenisch, George H. Stover, L. G. Cole, George E. Pfahler and A. W. Crane.

Dr. Fedor Haenisch read a paper entitled "The Value of the Roentgen Rays in the Early Diagnosis of Carcinoma of the Bowel," which was discussed by Drs. George E. Pfahler, George H. Stover, Henry K. Pancoast, E. W. Caldwell, L. G. Cole, Edward H. Skinner, Henry Hulst, and in closing by the essayist.

The next paper was read by Dr. Arthur Holding, Albany, N. Y., entitled "Observation of Cases of Constipation and Obstipation by Means of the Roentgen Rays."

The discussion was opened by Dr. Edward H. Skinner, and continued by Drs. A. W. Crane and Henry Hulst.

Adjourned until 10:00 A. M., Sept. 30th.

In the evening, at 8:30, an informal meeting was held, at which the members exhibited plates and lantern slides of interesting cases.

SECOND DAY—MORNING SESSION.

The Society reconvened at 9:30, and was called to order by the President.

Dr. Pancoast, Chairman of the Executive Committee, reported that the Committee had acted favorably on the applications for membership of the following:

Active Members.

Fred H. Albee, New York; James T. Case, Battle Creek; George C. Chene, Detroit; Walter J. Dodd, Boston; Chas. A. Donaldson, Minneapolis; Otto H. Foerster, Milwaukee; Harrison A. Greaves, Philadelphia; George W. Grier, Pittsburg; H. M. Imboden, Clifton Springs, N. Y.; Carl P. Lathrop, Buffalo; Capt. Leon T. Lewald, New York; A. J. Quimby, New York; W. A. Quimby, Blaine, Ohio; John H. Selby,

Rochester, Minn.; Miles B. Titterington, Jerseyville, Ill.; Raymond L. Wodhams, Wilkes Barre.

Corresponding Members.

Dr. Guido Holznecht, Vienna; Dr. Klynens, Antwerp; Dr. Alban Kohler, Wiesbaden; Dr. Gottwald Schwartz.

On motion, the Secretary was instructed to cast the unanimous ballot of the Society for the election to membership of these applicants, which he did, and they were declared duly elected.

Dr. Edward H. Skinner, Chairman of the Committee on Revision of the Constitution and By-Laws, presented the following report, action on which was deferred until the following day:

CONSTITUTION.

ARTICLE I.

Name: The society shall be known as the American Roentgen Ray Society.

ARTICLE II.

Object: The object of the society shall be the study and practical application of the Roentgen Rays.

ARTICLE III.

Section 1. The members shall be active, corresponding, honorary and associate, and shall be persons interested in the object of the society, recommended by at least two members in writing, and approved by the executive committee, who must have proof of their good ethical standing. They shall be elected by ballot.

Section 2. Active members shall be residents of America, shall sign the constitution, and pay annual dues of $10.00, which shall include subscription to the American Quarterly of Roentgenology.

Section 3. No member who is in arrears for annual dues shall vote, hold office or be entitled to receive the transactions. It shall be the duty of the treasurer to erase from the

roll of membership the name of every member who is in arrears for two years, and report such action at the annual meeting for confirmation.

Section 4. Corresponding members shall be residents of foreign countries.

Section 5. Honorary members shall be persons who have distinguished themselves in Roentgen Ray research or practical work.

Section 6. Associate members shall be persons who are interested in the advancement of the Roentgen Ray, but who are not actively engaged in radiographic or radiotherapeutic work, whose membership is not otherwise provided for. They shall be required to pay annual dues of $10.00, which sum shall include subscription to the American Quarterly of Roentgenology.

Section 7. Corresponding, honorary and associate members shall have all the privileges of active members, except to vote and hold office.

ARTICLE IV.

Officers: The officers shall be a President, five vice presidents, secretary, treasurer, an executive committee of three, and a board of censors, which shall consist of the three last ex-presidents. The officers shall be elected annually by ballot.

ARTICLE V.

DUTIES OF OFFICERS.

Section 1. The president shall perform all the duties pertaining to that office, and shall deliver an address during the annual meeting.

Section 2. In the absence of the president, one of the vice-presidents shall preside.

Section 3. The secretary shall keep, or cause to be kept, a correct record of all transactions of the society in a permanent form. He shall send due notice of all meetings to each member, shall notify all members of committees of their appointment and of the duties assigned to them. He shall conduct the correspondence and perform all duties usually pertaining to his office. The secretary shall have printed an

alphabetically arranged list of the members of the society, with their addresses, for free distribution to members applying for same, which list shall be revised from time to time, and shall specify charter members.

Section 4. The treasurer shall receive and be accountable for all money that shall come into his hands by virtue of his office. He shall give good and sufficient bond to the executive committee for the safe keeping and disposal of his trust, and shall make a full report to the society annually. He shall pay out money only by the written approval of the president and chairman of the executive committee.

Section 5. An executive committee of three members shall be elected as follows: one for three years, one for two years, and one for one year; and thereafter one annually to serve for three years. They shall hold the bond of the treasurer, audit his accounts annually, arrange for annual meetings, and have general supervision of the affairs of the society not otherwise provided for.

Section 6. A board of censors, consisting of the three last ex-presidents, the senior of whom shall be chairman, shall consider all matters pertaining to the conduct of members of the society, and after due consideration and investigation of complaints, if it appears to be misconduct, they shall communicate with the member in question. Upon a continuation of the misconduct they shall refer the matter to the society at the next annual meeting for further action.

ARTICLE VI.

Meetings: The annual meeting shall be held on the Wednesday following the second Tuesday of December of each year unless otherwise arranged by the executive committee.

ARTICLE VII.

Section 1. A committee of publication, consisting of five members, of which the president and secretary shall be members, shall be elected at each annual meeting. They shall be nominated by the nominating committee and elected at the same time as the other officers. The publication committee shall appoint the editor of the American Quarterly of Roent-

genology, and thereafter their power shall cease, except in an advisory capacity.

ARTICLE VIII.

This constitution may be amended by a three-fourths vote of all the members present at an annual meeting, provided the proposed amendment has been read before the society at least one day previously, and the hour for action has been set by the society and announced in open meeting at least one day previously.

BY-LAWS.

1. A nominating committee of three shall be appointed by the president on the first day of meeting. Said committee shall make report on the second day of meeting.

2. The newly elected officers shall take office at the close of the last day of the meeting at which they are elected.

3. All matters of parliamentary usage not already provided for shall be decided according to Roberts' Rules of Order.

4. Papers shall be limited in reading to twenty minutes. Openers of discussion shall be allowed ten minutes and all others five minutes. No person shall speak twice on the same subject except by permission of the meeting.

5. A member found guilty of reprehensible conduct may be expelled from the society on recommendation of the executive committee, and by a two-thirds vote of members present.

6. The order of business shall be:

(1) Call to order.

(2) Reading of minutes.

(3) Unfinished business.

(4) Reports of committees.

(5) Election of members.

(6) New business.

(7) Announcement of nominating committee by the president, or report of same to the society.

(8) Reading of essays.

The Chair at this juncture appointed the following Nominating Committee: Drs. Henry K. Pancoast, Alfred L. Gray and Henry Hulst.

Dr. Alfred L. Gray renewed informally the invitations he presented at the last meeting of the Society from various organizations in Richmond, Virginia, asking the Society to hold its next annual meeting in that city. Dr. Henry Hulst extended a similar invitation on behalf of Grand Rapids, Michigan, and Dr. George H. Stover extended an invitation on behalf of Denver, Colorado.

These invitations were referred to the Executive Committee for action.

Dr. George E. Pfahler, Philadelphia, read a paper on "The Roentgen Rays as an Aid in the Diagnosis of Gall-Stones."

The paper was discussed by Drs. Fedor Haenisch, Henry Hulst, A. M. Cole, F. H. Baetjer, T. E. Potter, Charles F. Bowen, Alfred L. Gray, J. Rudis-Jicinsky, Percy Brown, Edward H. Skinner, L. G. Cole, H. E. Ashbury, and in closing by Dr. Pfahler.

Dr. Sidney Lange, Cincinnati, contributed a paper entitled "Enlargement of the Thymus Gland Treated by the X-ray."

The discussion was opened by Dr. Henry K. Pancoast, and continued by Drs. W. F. Manges, F. H. Baetjer, D. R. Bowen, A. M. Cole, George C. Johnston, and in closing by Dr. Lange.

The paper by Dr. Russell H. Boggs, of Pittsburg, on "The Roentgen Treatment of Carcinoma of the Breast," was read by Dr. Johnston.

Dr. J. Rudis-Jicinsky, Cedar Rapids, Iowa, read a paper on "Roentgen Ray Therapy and its Practical Application in Malignant Lesions."

Dr. George C. Johnston, Pittsburg, read a paper on the "Therapeutic Efficiency of Roentgen Irradiation."

The discussion on these three papers was opened by Dr. Alfred L. Gray, and continued by Drs. W. F. Manges, H. W. Dachtler, H. K. Pancoast, D. R. Bowen, Fedor Haenisch, W. C. Hill, George E. Pfahler and, in closing, by Drs. Johnston and Rudis-Jicinsky.

Dr. Henry K. Pancoast, Philadelphia, read a paper entitled "Leukemia," which was discussed by Mr. H. W. Dachtler

and Drs. Roland Hammond, J. Rudis-Jicinsky, and in closing, by the essayist.

The Society then adjourned, to take an automobile ride around the city, arranged for by the Local Committee.

SECOND DAY—EVENING SESSION.

The Society reassembled at 9 o'clock.

Dr. George H. Stover moved a rising vote of thanks to the Local Committee of Arrangements, and through them to its friends, for the very great pleasure given to the members of the Society by the automobile ride in the afternoon.

Seconded and carried.

Drs. W. F. Manges and Fedor Haenisch showed some lantern slides of interesting conditions.

Mr. H. Clyde Snook, Philadelphia, read a paper on the "Physics and Optics of Stereoscopic Roentgenology."

The discussion was participated in by Drs. George C. Johnston, E. W. Caldwell, Henry Hulst, and Mr. Snook, in closing.

Dr. W. F. Manges, Philadelphia, read a paper entitled "Measurement of the Diameters of the Female Pelvis."

Discussed by Drs. George H. Stover and George C. Johnston.

Dr. Kennon Dunham, Cincinnati, contributed a paper entitled "Stereoscopic Examination of the Chest." This paper was discussed by Drs. P. M. Hickey, George H. Stover, Henry Hulst, and Dr. Dunham, in closing.

Dr. E. G. Beck, Chicago, read a paper on "Stereoscopic Radiography as an Aid to the Surgeon," and Dr. E. W. Caldwell, New York, read a paper on "Stereoskiagraphy of the Urinary Tract."

These papers were discussed by Drs. Sidney Lange, H. W. Dachtler, H. C. Snook, W. F. Manges, George E. Pfahler, and Dr. Caldwell, in closing.

Adjourned.

THIRD DAY—MORNING SESSION.

The Society reassembled and was called to order by the President at ten o'clock.

The report of the Committee on Revision of Constitution and By-Laws was considered and discussed and on motion was adopted.

The Nominating Committee then presented the following report:

President, Percy Brown, Boston, Mass.; Vice-Presidents, W. C. Hill, Cleveland; Edward H. Skinner, Kansas City, Mo.; and W. F. Manges, Philadelphia; Secretary, F. H. Baetjer, Baltimore; Treasurer, Charles F. Bowen, Columbus, Ohio.

Executive Committee, Arthur Holding, Albany, to take the place made vacant by Dr. Osgood.

Publication Committee, P. M. Hickey, Detroit; Sidney Lange, Cincinnati, and D. R. Bowen, Rome, N. Y.

On motion of Dr. E. W. Caldwell, this report was accepted, and the Secretary was instructed to cast the ballot of the Society for the election to office of those whose names had been presented by the Committee, which he did.

The Executive Committee further recommended that the next annual meeting of the Society be held in Richmond, Virginia, at such time as the Committee and the Local Committee of Arrangements may decide.

On motion, the recommendation was concurred in and Richmond was duly selected as the place for holding the next annual meeting.

Dr. F. H. Baetjer, Baltimore, Chairman of the Auditing Committee, reported that the Committee had examined the books of the Treasurer, and found them to be correct. On motion, the report was accepted.

Dr. Percy Brown, Boston, read a paper entitled "The Position of the Roentgenologist in His Own Community." The paper was not discussed.

Dr. Henry S. Upson, Cleveland, contributed a paper entitled "Serious Mental Disturbances Caused by Painless Dental Lesions."

The paper was discussed by Drs. W. C. Hill, H. K. Pancoast, Fedor Haenisch, C. W. Coon, E. W. Caldwell, W. F. Manges, George H. Stover, D. R. Bowen, George C. Johnston, George E. Pfahler, and in closing by Dr. Upson.

Dr. F. H. Baetjer, Baltimore, read a paper on "Bone Cysts," which was discussed by Drs. George C. Johnston, D. R. Bowen, H. W. Dachtler, Fedor Haenisch, C. W. Coon, P. M. Hickey, George E. Pfahler, and Dr. Baetjer, in closing.

Dr. Roland Hammond, Providence, R. I., read a paper on "Chronic Joint Disease from a Roentgenologic Standpoint."

The paper was discussed by Drs. George H. Stover, Percy Brown, C. W. Coon, H. W. Dachtler, and Dr. Hammond, in closing.

Dr. George H. Stover, Denver, Colorado, read a paper entitled "The Radiographer's Property Right in the Radiogram."

Discussed by Dr. Pancoast.

On motion of Dr. Pancoast, the following resolution was adopted:

RESOLVED: That the American Roentgen Ray Society endorses the views presented in Dr. Stover's paper, vesting a property right in the radiogram, with the radiographer, inasmuch as the radiogram is a part of his clinical record of examination.

The Executive Committee through its Chairman, Dr. Pancoast, reported favorably on applications for membership in the Society. (See pages 269 and 270.)

On motion, the Secretary was ordered to cast the unanimous ballot of the Society for the election to membership in the Society of these applicants, which he did.

Dr. Charles F. Bowen, of Columbus, read a paper entitled "The Removal of Foreign Bodies under Fluoroscopic Examination."

The paper was discussed by Drs. W. F. Manges, George C. Johnston, Kennon Dunham, A. L. Gray, George C. Stover, E. W. Caldwell, and Dr. Bowen, in closing.

Dr. Clarence E. Coon, Syracuse, N. Y., described "A Localizer for General Use."

His paper was discussed by Mr. Snook.

Dr. L. G. Cole, New York City, contributed a paper entitled "Cinematographic Roentgenography."

This paper was not discussed.

On motion, the paper by Dr. Sinclair Tousey, New York City, on "The Symptomatic Cure of Prostatic Hypertrophy by X-Rays and High Frequency Currents," and the paper by Dr. Harvey Cushing, Baltimore, on "Tumor of the Hypophysis Cerebri and When to Operate," were read by title and ordered published.

On motion, a vote of thanks was extended to the Local Committee and to the retiring officers for their untiring efforts to make this meeting a success and for their devotion to the best interests of the Society.

At this juncture the President-elect, Dr. Percy Brown, was escorted to the Chair, and addressed the Society briefly, thanking the members for the honor conferred on him.

There being no further business to come before the Society, an adjournment was taken, subject to call, by the Executive Committee.

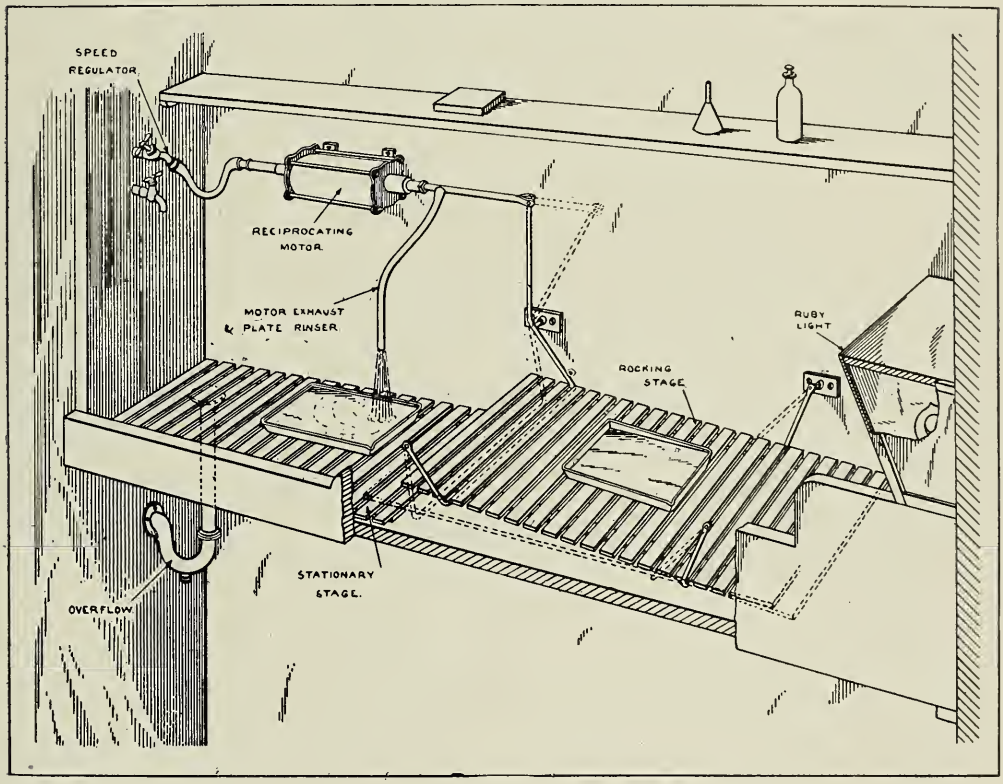
A RADIOGRAPHIC PLATE ROCKER.

BY ROLAND O. MEISENBACH, M. D., BUFFALO, N. Y.

After having employed various appliance for developing Radiographic plates, the rocking motion was found to be the most efficient and more closely resembling that which is used by photographers for developing photographic plates, the exposures of which are of different lengths. The excellency of the negative frequently depends upon the manipulation of the plate while in the developer, different results may be had by variation of this manipulation. Aside from the exposure and the chemistry of photography, other things being equal, an under-exposed plate may be fogged if the developer moves too rapidly, as may also be an over-exposed plate if the developer moves too slowly. Experience has shown that a titubaling motion of the developing tray may concentrate

the precipitate of the developer so that it has an unequal effect upon the plate.

An under-exposed radiographic plate can often be forced by the speed with which the solution passes over the film. By having the speed of the plate rocker under easy control, the desired effect in developing may be secured. For this purpose a simple and effective plate rocker has been devised by the author after having discarded titubalators and the like. The frequency with which requests for sketches and detailed construction from visiting surgeons who have seen it in operation have come to me, has prompted me to give this description which may be of interest.



The Plate Rocker (Fig. 1) has been used almost daily for over two years and has therefore been thoroughly tried out. It has required no attention during that time. The apparatus can easily be installed by any carpenter. It consists essentially of two parts, a reciprocating water motor and the Rocker. The water motor can be procured from any hardware dealer and is ordinarily used for washing machines. It should

be firmly fastened to the wall of the dark room and connected to the water supply; the piston rod is attached to the upright of the Rocker and the speed of the motor controlled by means of the faucet to which it is connected. The exhaust moves to and fro with the piston rod; the water flowing from it is conveniently used to rinse the plates after they have been taken from the developer. The Rocker proper is suspended on the inner sides of the wooden concrete drain box and may be built as large as desired; any number of trays can be placed upon the platform rack.

The advantages of this simple Plate Rocker are that its construction is simple, its speed can be regulated in an instant, its motion is almost noiseless and pitches the developer properly, and further, that it does not heat but tends to cool the dark room and developing solutions in warm weather.

140 Allen St.

TRIBUTE TO DR. KASSABIAN.

To Dr. Mihran Krikor Kassabian, friend, colleague, author and gentleman, we would pay great tribute.

We respected and honored him in life; we lament and mourn his demise. The memory of him will always remain sacred to us. The history of his life affords much that is interesting and commendable.

He was born on August 25th, 1870, at Cessaria, Cappadocia, Asia Minor (Armenia). He died July 14th, 1910, in Philadelphia, Pa.

Almost from his birth to his death he was surrounded by danger. In his home country he was exposed to epidemics of cholera, experienced the terror of earthquake, and was surrounded by the horror of massacre. In his adopted country he was one of the first to take up the study and use of the Roentgen Ray, was in the Spanish American War, and enlisted in the regular army (Hospital Corps).

Dr. Kassabian's early education was received in an American Missionary Institute, where he afterward became a teacher. Early in life he became interested in photography and attained great skill. In 1893 he went to London, where he

studied theology; from there he came to America (1894) and again took up work in photography, until the fall of 1895, when he matriculated at the Medico-Chirurgical College of Philadelphia, and graduated in the spring of 1898!

During his college life he spent all his spare time and vacations earning money to obtain his medical education, and he was never idle.

Soon after graduating he was appointed skiagrapher and instructor in Electrotherapeutics in the Medico-Chirurgical Hospital and College of Philadelphia, in which capacity he served until 1902. In 1903 he was appointed director of the Roentgen Ray Laboratory of the Philadelphia Hospital, which position he held until his death.

The most striking features of Dr. Kassabian's life were that he was a constant student, a hard worker and a thorough investigator. With limited means and education he completed his medical course in a praiseworthy manner.

Roentgen had just recently described his discovery and told the world of its wonderful properties and its possible value as a diagnostic agent. This interested Dr. Kassabian immediately, and before he took up the work he had investigated the then known properties of the X-Ray. With his usual enthusiasm he took up the practical application of the rays and started in to help along the most remarkable development of this wonderful agent. Ignorant of the dangers and cognizant only of his duty and the possibility of new discovery he was exposed constantly to the action of the rays. Precaution of any sort was unheard of. The comparative value of fluoroscopic work then, was greater than now because of the fact that skiagraphs were difficult to make. The demand of the surgeon was for a fluoroscopic examination. It was the ambition of the operator to demonstrate by means of a skiagraph, and in this Kassabian did some of his most valuable work, because of his skill in photography and a good working knowledge of electricity.

It was during his first few years of work that he received the injuries which afterward brought him to an untimely end. Strange it may seem, but he was among the first to realize

the harmful effects of the rays. He realized his danger but could not possibly be aware of the incurable nature of the damage he was receiving. He has often said among his friends, "I would have stopped the fluoroscope then but they would not let me."

In those days there was a tendency for the charlatan to make use of electricity in all its possible phases, and it was largely the efforts of Dr. Kassabian and his colleagues that kept the Roentgen Rays from becoming a headline of the advertisement of the "quack."

Dr. Kassabian was a charter member of the American Roentgen Ray Society, was a potent factor in its early development, and remained an active and enthusiastic worker to his last days.

The use of X-rays in forensic medicine interested him greatly. His thoroughness, fairness and skill have done much toward establishing the value of this agent before the courts. He was a most excellent expert witness.

The results of his labors remain as a monument to his memory in the two editions of his "Electrotherapeutics and Roentgen Rays." Encouraged and advised by the leading scientists and physicians of Philadelphia and elsewhere, Dr. Kassabian started this work in 1903. In 1907 the first edition was published, and the second edition was taken from the press just about the time of his death.

One need but examine these books to realize the thorough and painstaking manner in which he worked. Only a few of us know how he suffered during the last two years of his life, and we all had the most wonderful admiration for him because of his patience, his constant continuation of his labors, and his heroic acceptance of the radical measures adopted in the effort to save his life.

During his professional career he was honored by the Government of Pennsylvania with the appointment of X-ray expert to the tuberculosis congress, and by The American Medical Association as its representative to international meetings in foreign countries.

He had a professional dignity and reserve, skill and knowledge that won for him the confidence and appreciation of both patient and physician.

After having become a naturalized citizen of the United States he went back to his former country and married a charming and intelligent lady of his own nationality.

To this lady, his bereaved widow, we would extend a most profound sympathy. She is to be more than admired for the loving, tender, and womanly manner in which she cared for her husband through his protracted and terrible suffering.

W. F. M.

ABSTRACTS FROM CURRENT LITERATURE

Orthodiagraphy in Pathological Conditions of the Heart and Aorta. Claytor (Thos. A.) and Merrill (Walter H.) in Am. Jour. of the Med. Sciences, Oct., 1910, p. 506, continue their studies published in the same journal Oct., 1909, p. 549, in which their technic was given.

By implication, at least, much importance is laid upon trained observation and the statement is made that "after some experience in making diagrams of the heart it is seldom necessary to resort to the actual measurement of the resulting figure, as one may see at a glance whether or not there is any material distortion of the outline."

Due notice is taken of the normal variation in the size of the heart, and other difficulties and sources of error are considered.

Twenty-one diagrams of normal and pathological conditions are given.

This article is another index of the growing interest in the art of fluoroscopy.

Bone Cysts, Ostitis Fibrosa, Giant Celled Sarcoma and Bone Aneurism of the Long Pipe Bones. Jos. C. Bloodgood, M. D., Baltimore. Annals of Surgery, Aug., 1910, p. 145.

Two classifications of bone cysts are given comprising 89 cases.

Group (A) (69 cases)—The true bone cysts, which have a definite relation to ostitis fibrosa.

1. Medullary cysts (16 cases), in which the bony shell has no definite connective tissue lining.

2. Cyst with definite connective tissue lining (22 cases).

3. Small cyst or cysts in a solid mass of ostitis fibrosa (6 cases).

4. No cysts but the bone shell is filled with solid mass of (7 cases).

5. Multilocular cysts (6 cases).

6. Miscellaneous: (a) infected, 1 case; (b) X-ray studies only 5 cases; (c) autopsy specimens, 3 cases; (d) healed bone cysts, 2 cases; (e) cysts in infantile scurvy, 1 case.

Group (B) (20 cases)—Cysts in the medullary cavity due to other conditions.

7. Cysts in cartilage tumors or enchondromas (4 cases).

8. Pure myxomas with or without cysts (5 cases).

9. Cysts in giant cell sarcoma (4 cases).

10. Cysts in arthritis deformans or ostitis deformans (4 cases).

11. Cysts due to a subperiosteal hematoma with a bony wall due to ossifying periostitis (2 cases).

12. Callus cysts (1 case).

Writing of giant cell sarcoma, Bloodgood says: "The X-ray shadow does not differ at all from that of a bone cyst. * * * In my experience, in the fully developed bone cyst or giant cell sarcoma, one would be able to exclude with considerable certainty any other medullary lesion, except the myeloma when occurring as a single lesion, but I can imagine that in the very early stage of the more malignant medullary sarcoma the shadow could not be differentiated from that of cyst or giant cell sarcoma. For this reason the ultimate diagnosis must rest until the exploratory incision is made."

Some excellent reproductions are shown while one or two are of the sort that aid the expert little and lead the general practitioner into doubt. A long bibliography is given.

The Radiographic Diagnosis and Classification of Early Pulmonary Tuberculosis. Lewis Gregory Cole, M. D., New York. Am. Jour. of the Med. Sciences, Philadelphia, Oct., 1910, p. 29.

In this paper appears in detail the most complete record to date of the writer's well-known work. Of especial interest is the statement: "I have been criticised for stating that certain plates showed miliary tubercles. * * * In speaking of miliary tubercles, I refer to those of moderate size, which on cross section of the lungs appear as grayish-white nodules about the size of a pin head. Pathologically these are composed of exudate or productive tissue in a number of adjoining air cells. In studying them radiographically they are compared in density with the air that should normally fill those cells, instead of tissue of similar density as is the case in tuberculous infection in any other part of the body. * * * It is the intermediate tubercles, the smallest ones that are clearly discernible to the naked eye on the cross section, those that give the 'shotty' feeling to the cut surface of the lung, that show clearly in a radiogram having sufficient detail. It is on these tubercles that the positive diagnosis of incipient pulmonary tuberculosis by the X-ray depends." Much of the paper has appeared before, but the classification is new and the whole merits careful study.

The 21 reproductions are a credit to the publishers and the accompanying legends add much to the clearness of the text.

A Universal X-Ray Frame. Anedee Granger, M. D., New Orleans. N. Y. Med. Jour., Sept. 10, 1910, p. 504.

This apparatus has since been patented.

The writer describes apparatus somewhat of the Beclere type, its essential differences being the use of bevel gears to replace the balancing weights and the use of floor and ceiling

tracks upon which the uprights are movable in one direction. This frame is claimed to be applicable for all positions of radiography and fluoroscopy.

Fully lettered illustrations make the text clear for one who wishes to construct similar apparatus.

The Diagnosis of Stone in the Pelvic Ureter. A Preliminary Report of Certain Limitations of Radiographic Diagnosis and a Suggested Remedy. Hugh Cabot, M. D., and W. J. Dodd, M. D., Boston. Boston Med. and Surg. Jour., July 21, 1910, p. 85.

After quoting, from Jeanbrau, the three causes of non-visibility of calculus by the X-ray:

(1) Faulty technique (absence of compression, tube of too high penetration, etc.).

(2) Chemical composition of the stone.

(3) Its small size; the writers add **(4) The position of the stone.** Two cases are related. (I) In which, after negative radiographs by an expert, a "fair sized" oxalate stone was taken by operation from the ureter at the point where it crosses the iliac vessels.

Profiting by this experience case II was radiographed with the patient lying on the back with an Edebohls bag under the lumbar vertebrae, tube 30 in. from the plate, over the umbilicus and directed obliquely downward into the pelvis. A larger oxalate stone was shown which had been invisible by ordinary technic.

From these cases they conclude that (1) even with good technic, stones of moderate size and high density may fail to show when they lie in the portion of the ureter lying in front of the sacro-iliac joint, if the tube be placed in the ordinary position. (2) Some, at least, of the calculi lodged in this position can be detected by X-ray if the tube be placed in the position described.

After detailing some experiments upon the skeleton, the writers state, "The application of these observations to actual

conditions depends chiefly upon the thickness of the iliopsoas muscle. A large muscle will make detection of calculi by this method relatively easy, while a thin muscle will make it difficult."

DAVID R. BOWEN, M. D.

FORTSCHRITTE AUF DEM GEBIETE DER ROENTGENSTRAHLEN.

BAND XV, HEFT 4, 5, 6.

Roentgenologic Diagnosis of Fractures of the Base of the Skull, by Dr. Alexander Markovic.

The Roentgen method is a very valuable aid in the diagnosis of fractures of the base of the skull.

Four typical positions are described:

1. The ordinary lateral view: (a) sinistro-dextral and (b) dextro-sinistral.

2. The usual postero-anterior view as for examining the frontal sinus.

3. The antero-posterior view: (a) fronto-occipital and (b) through the open mouth.

4. The oblique lateral view: (a) axis of ray from exit angular process of one side to malar prominence of other and (b) vice versa.

The pathologic changes which may be recognized are:

1. Actual loss of continuity of the cranial bones. Fissures must be carefully differentiated from sutures and grooves for arteries.

2. Hemorrhage into the pneumatic spaces.

3. Secondary changes, such as empyema of one or more of accessory sinuses, exostoses of cranial bones, calcification areas in brain, and exceptionally an intercranial tumor.

Five cases of fractures of base of brain recognized by X-ray examination are briefly described. In all of the cases the X-ray findings were fissured fractures in the occipital region. According to Markovic but three other cases of fractures of base of skull recognized by X-ray examination are on record.

Periarthritis Humero-scapularis with Calcification, by Dr. G. Fedor Haenisch.

This term is applied to the conditions in which upon the radiogram peculiar shadows are found in the area between acromion and greater tuberosity of humerus. Bursitis subdeltoideus and sub-acromialis, or Duplay's disease are synonyms for this condition. The report is based on the examination of 12 cases. Six cases are described in detail. The onset of symptoms is usually gradual, with a feeling of loss of power in arm, pain and tenderness over greater tuberosity or below acromion and limitation movement, especially of abduction. Four of the cases were directly traceable to a previous trauma.

The X-ray finding consists in irregular, structureless masses of varying size and thickness just above greater tuberosity. In the traumatic cases the shadow cannot always be differentiated from an injury to the greater tuberosity.

The cause of the shadow in most cases has been found to be lime deposits in the sub-acromial bursa, occasionally the sub-deltoid bursa is involved.

The relation of the pain and acute symptoms to the calcification is not constant. Marked symptoms occur in cases in which the X-ray shows no shadows and vice versa. After the process is an old one lighted up by a trauma.

The course of the disease is variable. In two cases the shadows disappeared under conservative treatment. As a last resort, excision of the bursa is recommended.

Concerning Lung Induration, by Dr. von Dehn.

A 17-year-old boy who three years previously had made a poor recovery from variola, complained of pulmonary symptoms since that time. He was dyspnoeic, coughed and expectorated foul-smelling material in which no tubercle bacilli could be found. There was absolute dullness and bronchial breathing over the entire left chest.

X-ray examination revealed an almost complete clouding of left side, only a small amount of X-light penetrating the left apex.

A diagnosis of lung induration with (because of the profuse foul expectoration) bronchiectasis was made. This in all probability was secondary to a bronchial involvement accompanying the variola three years previous. The author calls attention to the tendency of the pulmonary tissue to react to irritants by the formation of fibrous tissue. This condition may follow lobar pneumonia or follow the bronchitis of influenza, typhoid, measles, pertussis, etc. Pleural adhesions, which interfere with expectoration, and bronchial gland enlargement (which Köhler found to be a common sequel to influenza, etc.) may lead to induration. The condition must be differentiated from fibroid phthisis.

The Roentgen Diagnosis of Pathologic Fixation and Displacement of Abdominal Organs, by Dr. C. B. Schürmayer.

The author calls attention to the frequency of adhesions of stomach (especially pylorus) and duodenum to liver and gall-bladder. Such a condition may follow either gastric ulcer or cholecystitis and clinically may simulate either.

Roentgenographically this condition may be recognized in several ways. When adherent to the liver the stomach is pulled over to the right and pylorus elevated during the retraction of liver (expiration). By "Roentgen palpation" before the fluoroscope, hooking the ulnar margin of hand over the pylorus, the traction on the pylorus by the adhesion may be seen. Deep respiration is painful at site of adhesion.

Adhesions of the colon may be likewise recognized by disturbed motility of same, and by a small elevation of wall of colon at site of adhesion. By Roentgen palpation a decrease in the respiratory displacement of colon may be noted.

The author comments upon the ease with which enteroptosis can be recognized by the low diaphragm and liver, by the low stomach and the increased lumbo-costal angle.

Nephroptosis which so frequently accompanies enteroptosis may be recognized fluoroscopically by a kink in diaphragm which the low kidney makes at the junction of its middle and outer thirds. Radiographically the low kidney may be recognized by its relation to psoas margin, to twelfth rib and to pelvic brim. Normally the lower pole of kidney does not go below the junction of second and third lumbar vertebrae and lies slightly external to psoas margin.

The importance is emphasized of the X-ray examination in gastroptosis in controlling therapeutic measures and in the choice of operative means for relief of same. The skiagram is often necessary to differentiate gastroptosis cachexia from that of carcinoma ventriculi.

Coloptosis often produces symptoms resembling appendicitis or typhlitis. Atony of caecum and appendiceal symptoms can be relieved by treating the mechanical causes of the constipation. Schürmayer does not subscribe to Holzknecht's theory of colon peristalsis. He claims to have a series of plates showing that the progress of the contents of the colon is slow and uniform. The great value of the X-ray in the above conditions is to indicate and control therapy and to make "exploratory laparotomies" less justifiable.

Isolated Fracture of the Capitellum of the Humerus, by Dr. G. Fedor Haenisch.

Dr. Haenisch reports the first case of isolated fracture of the capitellum (external condyle of the humerus). The injury was produced by a fall backward, the flexed elbow being placed against the back to break the fall. The external condyle thus received the direct force of the fall. The capitellum was fractured longitudinally and displaced slightly toward the volar aspect of arm. Both antero-posterior and oblique lateral skiagrams revealed the injury. Treatment consisted in operative removal of fragment.

Roentgenography and Roentgentherapy—Two Complementary Problems, by Dr. Th. Christen.

By a mathematical process Christen formulated equations to determine the character and intensity of X-rays best suited to Roentgenography and to Roentgentherapy. It is the non-absorbed rays that affect the photographic plate, whereas, the physiological effects upon the tissues depend upon the absorbed rays. Instead of absorption co-efficient, he adopts the term "Halbwertschicht," meaning the thickness of the layer of any material required to absorb just one-half of the rays of a given skiagraph. His conclusions are as follows:

1. For the best photographic representation of an enclosed material (e. g., bone) the quality of the rays must be so chosen that the "Halbwertschicht" of the surrounding material (e. g., muscles, etc.), fulfills equation No. 26 (see original article).

2. Finest shadow differences are shown best by using rays of such quality that $\frac{5}{8}$ are absorbed and $\frac{3}{8}$ passed through.

3. The effectual dose is not only proportional to the intensity and the time of exposure, but also to co-efficient of susceptibility and absorption or instead of latter inversely proportional to the "Halbwertschicht."

4. The principle of homogenous exposure is incorrect from the physical standpoint because in a homogenous field the absorption and therewith the effectual dose are both zero.

5. A deep lying tissue will receive the maximum dose when the penetration of the rays is such that the "Halbwertschicht" in the overlying tissues is 7/10 the thickness of these tissues or when the overlying tissues absorb $\frac{5}{8}$ and allow $\frac{3}{8}$ to pass through.

6. It is true that the relation between superficial and deep dosage is most advantageous the harder the rays and the greater the focal distance. Nevertheless, it is hardly advisable to use the rays harder than 7 or to increase the focal distance to more than five times the thick[illegible]e overlying tissue as the advantage gained would [illegible]ight to justify the great waste of Roentgen energy.

7. The relation between superficial and deep dosage can be more easily improved by artificially changing the co-efficient of susceptibility, especially by the method of Schmidt (pressure anaemia).

Critical Observations upon the Use of Contrast Producing Materials in Roentgenology, by Dr. C. Kaestle.

Kaestle emphasizes the great advantage of the use of Zirkon-oxid in X-ray work over the various bismuth preparations. Zirkon-oxid is absolutely non-poisonous in all quantities at all times. It is insoluble in concentrated hydrochloric acid. It requires one and one-half times the quantity to produce the same shadow as bismuth subcarbonate, but the Zirkon-oxid may be used in any quantity. It is much cheaper than any bismuth preparation.

Bone Carcinoma in the Radiograph, by Dr. George Becker.

Bone metastases in carcinoma are not such uncommon complications as the few recorded cases in the literature would lead one to believe. In the majority of cases, the condition has been discovered only at autopsy. In only a few cases either in the presence of palpable bone enlargement, spontaneous fractures or nervous symptoms from involvement of spine or skull has the diagnosis been made intra vitam. Even at autopsy the condition may be overlooked, for the bone destruction may, according to Recklinghausen, be accompanied by new bone formation, and thus be overlooked.

The skiagram showing such bone metastases may thus discover the presence of otherwise unrecognized primary tumors. The demonstration of these bone lesions is especially important in contraindicating operative measures in these cases. "Rheumatic" pains, general bone pains or nervous symptoms may call attention to the condition.

Bone metastases most frequently follow breast and prostate carcinoma, less commonly thyroid and stomach cancers, and rarely uterine or gall-bladder growths.

Two cases of widespread skeletal carcinomatosis are described both following mammary carcinoma. The metastases were found in ribs, spine, pelvis, skull, shoulder and hip.

A Typical Post-Traumatic Ostitis of the Carpal Scaphoid Often Leading to Spontaneous Fracture, by Dr. George Preiser.

Five cases of injured scaphoid in which a definite structural change in this bone followed the injury form the basis of this report. This change consisted in an area of rarefraction in the middle of the scaphoid and followed slight traumas to the wrist From a study of the blood supply of the bone. Preiser advances the theory that the rarefraction is consequent to a primary tearing loose of an important nutrient ligament from the middle of the bone. This rarefraction may render the walls so weak that, upon the X-ray plate it may simulate a fracture or because of this weakness a fracture may follow.

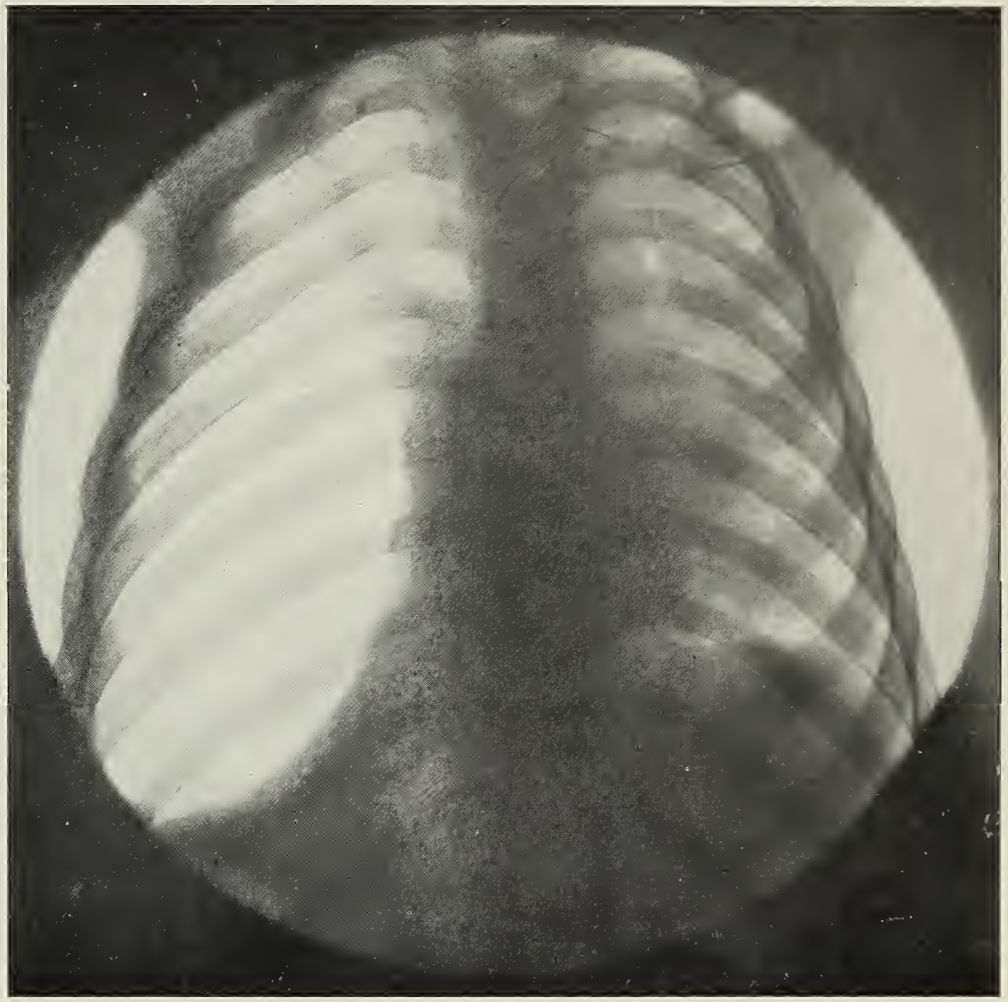
EDITORIAL.

QUALIFICATIONS OF THE ROENTGENOLOGIST OF THE PRESENT DAY.

As the outcome of the extraordinary development of X-ray work during the past few years, Roentgenology has now come to be recognized as one of the most important of the special branches of medicine, and for this reason, if for no others, the Roentgenologist should be fittingly qualified to assume the many responsibilities attending his work; and he should be able to command the respect and confidence of his profession through his personality as a medical man and his qualifications as a Roentgen expert. The general recognition of the importance of X-ray diagnosis during the first year or two following the announcement of Roentgen's discovery, called for the services of a large number of individuals, but because of the simplicity of the work and the comparative ease with which the crude apparatus could be manipulated at this undeveloped stage, the services of an expert or a specialist were hardly considered necessary, as is the case to-day. Not having the time to devote to it himself, the physician or the surgeon who realized the need of whatever X-ray work could then be accomplished, naturally placed it in the hands of someone under him. As a result, a large part of the early X-ray work, at least in this country, was, on the one hand, turned over to under assistants or even individuals with no medical training, such as hospital pharmacists or nurses; or on the other hand, patients were sent to expert electricians or physicists who were working with X-ray apparatus from a purely scientific standpoint, or even to dealers in X-ray equipment.

The subsequent rapid development of X-ray work along all lines soon called for the skill and experience of an expert, who not only understood the manipulation of the more complicated apparatus, the nature of the X-ray output, and the

CARCINOMA OF CLAVICLE AND ACROMION.
(Metastasis from Stomach.)
W. C. HILL, M. D.

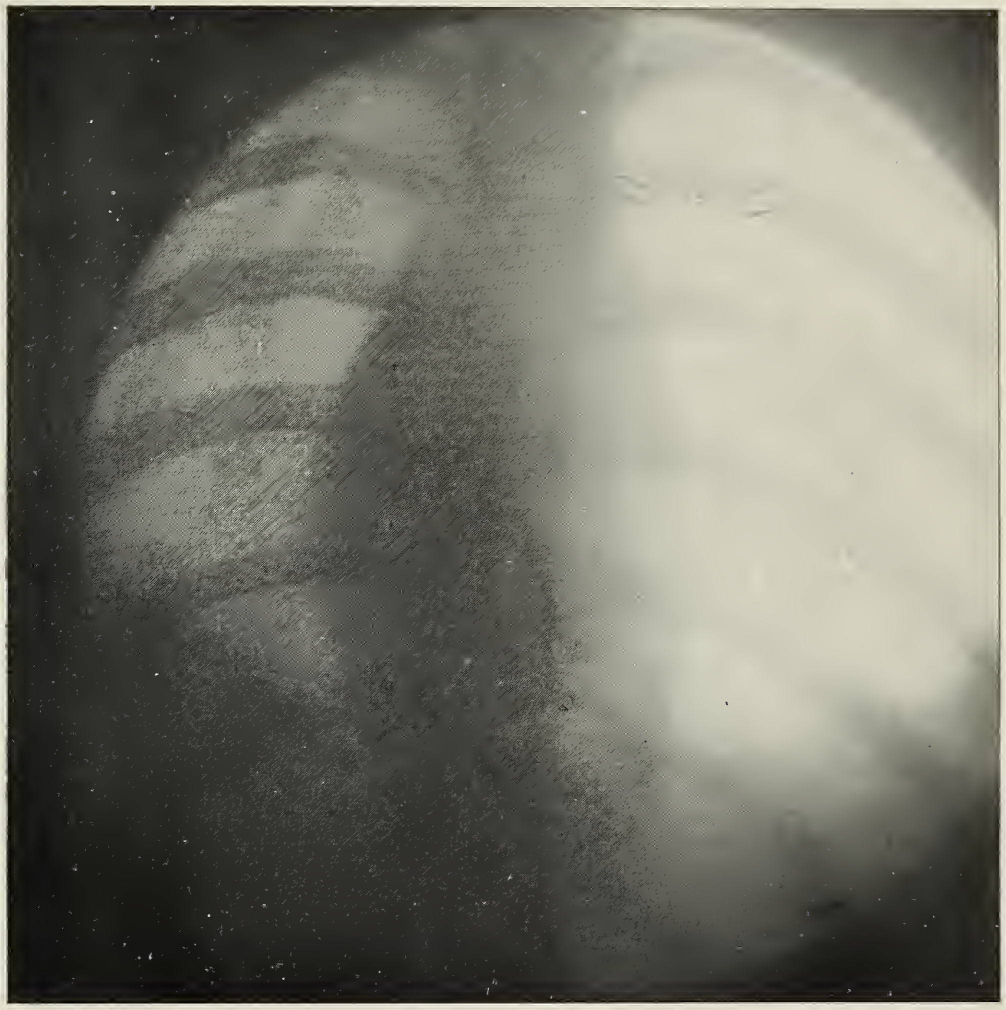


PNEUMOTHORAX SHOWING PARADOXICAL DIAPHRAGM.

Sidney Lange.

This plate is of especial interest because it shows a pure pneumothorax without any fluid or pus in the pleural cavity. The upper contour of the diaphragm is thus revealed. A comparison of the diaphragm contour of the two sides shows clearly the condition known as "paradoxical diaphragm" upon the affected side. It is low, has a concave instead of convex upper contour and executes paradoxical excursions, i. e., rises in inspiration and descends in expiration.

The collapsed lung is held by an adhesion at the apex. The opposite lung is infiltrated with tubercles.



SPINAL ABSCESS IN THE LOWER DORSAL REGION.

Sidney Lange, Cincinnati.

The patient, a girl aged 21, sought medical attention because of a fluctuating swelling in the right inguinal region. X-ray examination was requested to discover possible cause of this psoas abscess. There was some indefinite pain and stiffness in spine, but patient was able to move about, and bend the spine, etc., without much discomfort. Some muscular rigidity and a slight prominence of the spinous process of the 10th dorsal vertebra attracted attention to this part of the spine.

A close examination of the original plate revealed a fusion of the bodies of the 10th and 11th vertebra. The surrounding abscess could be distinctly traced, on the negative, through the diaphragm and into the psoas sheath.

means of measuring and controlling it in order to use it to best advantage and with the minimum of risk to the patient and himself; but whose medical training and Roentgenologic experience, on the other hand, qualified him to treat such conditions as were amenable to radiation and rendered him efficient as a Roentgen diagnostician.

While we are now inclined to excuse a large part of the evil that resulted at the hands of the early X-ray workers, on the grounds of ignorance of the dangerous effects of prolonged exposure and the lack of any means of estimating or of controlling the quality and volume of the X-ray output, and especially as a score or more of the pioneer workers have paid the penalty of their ignorance by death, and many more by the loss of fingers, hands, or arms, or by untold suffering, such is not our attitude at the present day, and the infliction of an X-ray ulcer upon a patient is rarely excusable and the chronic dermatitis is altogether avoidable on the part of those who have entered the field in comparatively recent years. Unfortunately these formerly excusable evils continue, and at a time when, for the most part, they cannot be regarded otherwise than as the results of inexcusable ignorance or of gross carelessness, and the altogether too frequent occurrence of the acute X-ray ulcer at the present time tends to reflect more or less discredit upon Roentgenology. We are fortunate in being able to trace the large majority of such accidents to the continuance of X-ray work in the hands of inexperienced medical graduates or individuals with not even a medical training. This much being definitely known, it is time that some steps were taken toward the correction of such an evil.

While this is undoubtedly both a difficult and a delicate proposition with which to deal, it is a subject which must be given serious attention in the near future. Perhaps the most rational method of dealing with it would be based upon some such principle as the recognition by Roentgenologists both here and abroad of certain definite qualifications as standard requirements in the case of anyone who attempts to practice Roentgenology. A further step would be an at-

tempt to make the medical profession realize the urgent necessity of such a move, and to seek their co-operation in putting it to practical test. The solution of the problem would be very simple if the profession as a body demanded that certain qualifications be fulfilled by Roentgenologists before referring their cases to the latter. Such an attitude should not be construed as being in any way an attempt to discourage new men from taking up X-ray work, for Roentgenologists are fully aware of the fact that the demand for efficient X-ray workers is to-day far greater than the supply, and that this will continue to be the case for some years to come. But the new man must be competent at the start, and unless some such stand is taken, not only will recent graduates in medicine take up the practice of X-ray work without adequate theoretical training and a safe amount of practical experience to properly fit them to assume the responsibilities such work entails, but also, individuals without even medical training. Strange as it may seem to many, it is a fact that there are to-day a large number of such individuals actively engaged in X-ray work who do not know the difference between a hard and a soft tube, or the indications for the use of one or the other; or who will attempt to employ one tube for all varieties of X-ray work; or who do not realize the absolute necessity of determining tube resistance or of using a milliammeter.

Most of the larger medical colleges include a course in Roentgenology in their curriculum, but in only a very few instances is such a course sufficiently comprehensive in itself to properly fit a man to take up X-ray work. Such courses may impart an adequate theoretical knowledge, but what is equally as important, but is rarely if ever provided for, is some actual practical experience, under the personal instruction of a competent Roentgenologist, in the manipulation of different forms of apparatus, the estimation and means of controlling X-ray output, the proper quality and volume of radiation required for different purposes, and the appropriate technic to be employed in each of the different applications of the X-ray. Moreover, one should be thoroughly familiar

with the sources of danger to both the patient and himself, and of the means of avoiding them. The responsibility of such teaching rests largely on the shoulders of the Roentgenologist, and if circumstances do not permit him to give the proper amount of training, he should make it a point to see that his pupils fully understand that his teaching alone does not fit them to assume the responsibilities of practicing Roentgenology.

In conclusion, the following suggestions are offered as possible means of lessening the dangers attending X-ray work and of furthering the progress and best interests of Roentgenology.

1. Anyone who attempts to practice Roentgenology for any purpose should be a medical graduate, with such preliminary training and practical experience as have just been advocated.

2. The X-ray laboratories of institutions should be placed in the charge of **competent** Roentgenologists, who should be recognized as the heads of such departments, and not dominated by members of either the staffs or the managements. A Roentgenologist who possesses the qualifications in respect to training and experience that are essential for his recognition as an expert certainly is deserving of the courtesy of an appointment on the staff of a hospital which he serves.

3. The manipulation of X-ray apparatus should not be intrusted to nurses or other unqualified assistants except under the direct supervision of the Roentgenologist.

4. The practice of Roentgenology by dealers in X-ray apparatus should be discouraged, because, in the first place, such individuals do not possess the requisite qualifications, and secondly, for the same reasons that the practice of any other branch of medicine by similar individuals is discountenanced.

5. The qualifications that should be recognized as essential to fit one to practice Roentgenology are, first, an adequate **theoretic** knowledge embracing electricity, electrical conductivity especially, all forms of X-ray apparatus and their man-

ipulation, and the various methods of determining and of controlling the quality and volume of the X-ray output; secondly, a suitable practical experience, gained through a course of several months' training as an assistant to an experienced Roentgenologist; and thirdly, a medical degree, because of the essential medical training which this implies.

6. Every possible precaution should be taken to protect patients from unnecessary evil effects of X-ray exposure. Likewise, the Roentgenologist should observe the proper precautions for his own protection, not only for his own welfare, but also because one who disregards the safety of his own person is likely to be regarded as careless in respect to that of his patients.

—H. K. P.

Vol. II. December, 1909. No. 1

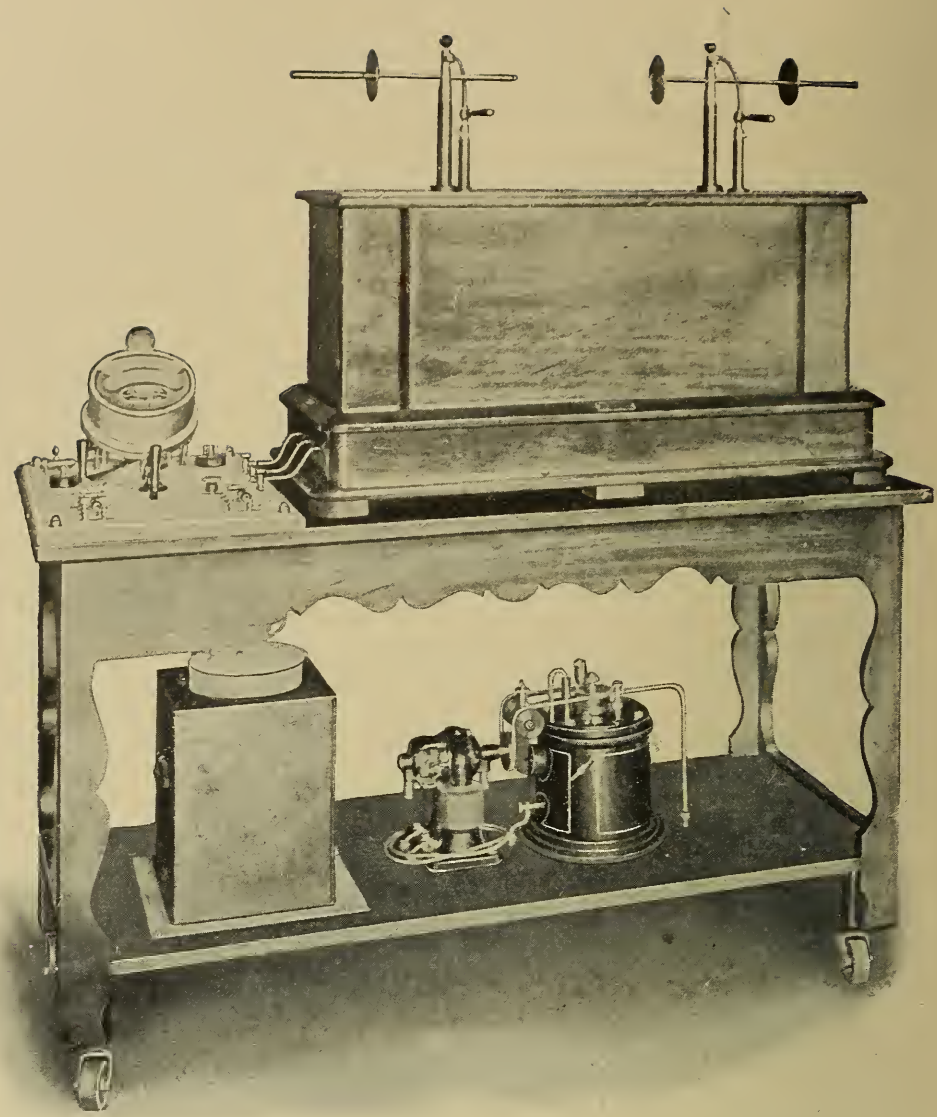
The American Quarterly of Roentgenology

PUBLISHED BY

The American Roentgen Ray Society

Edited by P. M. Hickey, M. D.

Published Quarterly. Subscription, Five Dollars a Year, Postpaid



Vol. II. March, 1910. No. 2

The American Quarterly of Roentgenology

PUBLISHED BY

The American Roentgen Ray Society

Edited by P. M. Hickey, M. D.

PAGE

Published Quarterly. Subscription, Five Dollars a Year, Postpaid

Officers of
American Roentgen Ray Society

President: GEORGE E. PFAHLER, M. D.,
1321 Spruce St., Philadelphia, Pa.

Vice-Presidents:

VERNON J. WILLEY, M. D., Rochester, Minn.
C. E. COON, M. D., Syracuse, N. Y.
RUSSELL D. CARMAN, M. D., St. Louis, Mo.
ROLAND HAMMOND, M. D., Providence, R. I.

Secretary: PERCY BROWN, M. D.,
155 Newbury St., Boston, Mass.

Treasurer: CHAS. F. BOWEN,
Grant Hospital, Columbus, Ohio

Executive Committee:

HENRY K. PANCOAST, M. D., University Hosp., Philadelphia, Pa.
ALFRED OSGOOD, M. D., New York City
P. M. HICKEY, M. D., 32 Adams Ave. West, Detroit, Mich.

Committee on Publication:

F. H. BAETJER, M. D., Baltimore
E. W. CALDWELL, M. D., New York
SIDNEY LANGE, M. D., Cincinnati

Committee on General Arrangements for Annual Meeting:

DR. ROLLIN STEVENS, Chairman, 623 Stevens Bldg., Detroit, Mich.
DR. PRESTON M. HICKEY, 32 Adams Ave. West, Detroit, Mich.
DR. HENRY H. COOK, - 270 Woodward Ave., Detroit, Mich.
MR. HARRY DACHTLER, - 237 Michigan St., Toledo, Ohio
DR. WALTER C. HILL, - 202 Osburn Bldg., Cleveland, Ohio
DR. WESTON A. PRICE, - 2238 Euclid Ave., Cleveland, Ohio

Committee on Commercial Exhibits:

DR. PRESTON M. HICKEY, Chairman, Detroit, Mich.
DR. HENRY H. COOK, Detroit, Mich.

Committee on Scientific Exhibits:

MR. HARRY DACHTLER, Chairman, Toledo, Ohio
DR. WALTER C. HILL, Cleveland, Ohio

ANNUAL MEETING

Hotel Cadillac, Detroit, Mich.

September 29, 30 and October 1, 1910

Vol. II. *September, 1910.* *No. 3.*

The American Quarterly of Roentgenology

PUBLISHED BY

The American Roentgen Ray Society

Edited by P. M. Hickey, M. D.

Published Quarterly. Subscription, Five Dollars a Year, Postpaid

Officers of
American Roentgen Ray Society

President: GEORGE E. PFAHLER, M. D.,
1321 Spruce St., Philadelphia, Pa.

Vice-Presidents:

VERNON J. WILLEY, M. D., Rochester, Minn.
C. E. COON, M. D., Syracuse, N. Y.
RUSSELL D. CARMAN, M. D., St. Louis, Mo.
ROLAND HAMMOND, M. D., Providence, R. I.

Secretary: PERCY BROWN, M. D.,
155 Newbury St., Boston, Mass.

Treasurer: CHAS. F. BOWEN,
Grant Hospital, Columbus, Ohio

Executive Committee:

HENRY K. PANCOAST, M. D., University Hosp., Philadelphia, Pa.
ALFRED OSGOOD, M. D., New York City
P. M. HICKEY, M. D., 32 Adams Ave. West, Detroit, Mich.

Committee on Publication:

F. H. BAETJER, M. D., Baltimore
E. W. CALDWELL, M. D., New York
SIDNEY LANGE, M. D., Cincinnati

Committee on General Arrangements for Annual Meeting:

DR. ROLLIN STEVENS, Chairman, 623 Stevens Bldg., Detroit, Mich.
DR. PRESTON M. HICKEY, 32 Adams Ave. West, Detroit, Mich.
DR. HENRY H. COOK, - 270 Woodward Ave., Detroit, Mich.
MR. HARRY DACHTLER, - 237 Michigan St., Toledo, Ohio
DR. WALTER C. HILL, - 202 Osburn Bldg., Cleveland, Ohio
DR. WESTON A. PRICE, - 2238 Euclid Ave., Cleveland, Ohio

Committee on Commercial Exhibits:

DR. PRESTON M. HICKEY, Chairman, Detroit, Mich.
DR. HENRY H. COOK, Detroit, Mich.

Committee on Scientific Exhibits:

MR. HARRY DACHTLER, Chairman, Toledo, Ohio
DR. WALTER C. HILL, Cleveland, Ohio

Vol. II. December, 1910. No. 4

The American Quarterly of Roentgenology

PUBLISHED BY

The American Roentgen Ray Society

Edited by P. M. Hickey, M. D.

Published Quarterly. Subscription, Five Dollars a Year, Postpaid

Officers of

American Roentgen Ray Society

PRESIDENT: PERCY BROWN, M. D.
Boston, Mass.

VICE-PRESIDENTS:

W. C. HILL, M. D., Cleveland, Ohio
EDWARD H. SKINNER, M. D., Kansas City, Mo.
W. F. MANGES, M. D., Philadelphia, Pa.

SECRETARY: F. H. BAETJER, M. D.
Baltimore, Md.

TREASURER: CHAS. F. BOWEN, M. D.
Columbus, Ohio

Executive Committee

HENRY K. PANCOAST, M. D., University Hosp., Philadelphia, Pa.
ARTHUR HOLDING, M. D., Albany, N. Y.
P. M. HICKEY, M. D., 32 Adams Ave. West, Detroit, Mich.

Committee on Publication

P. M. HICKEY, M. D., Detroit, Mich.
SIDNEY LANGE, M. D., Cincinnati, Ohio
D. R. BOWEN, M. D., Rome, New York